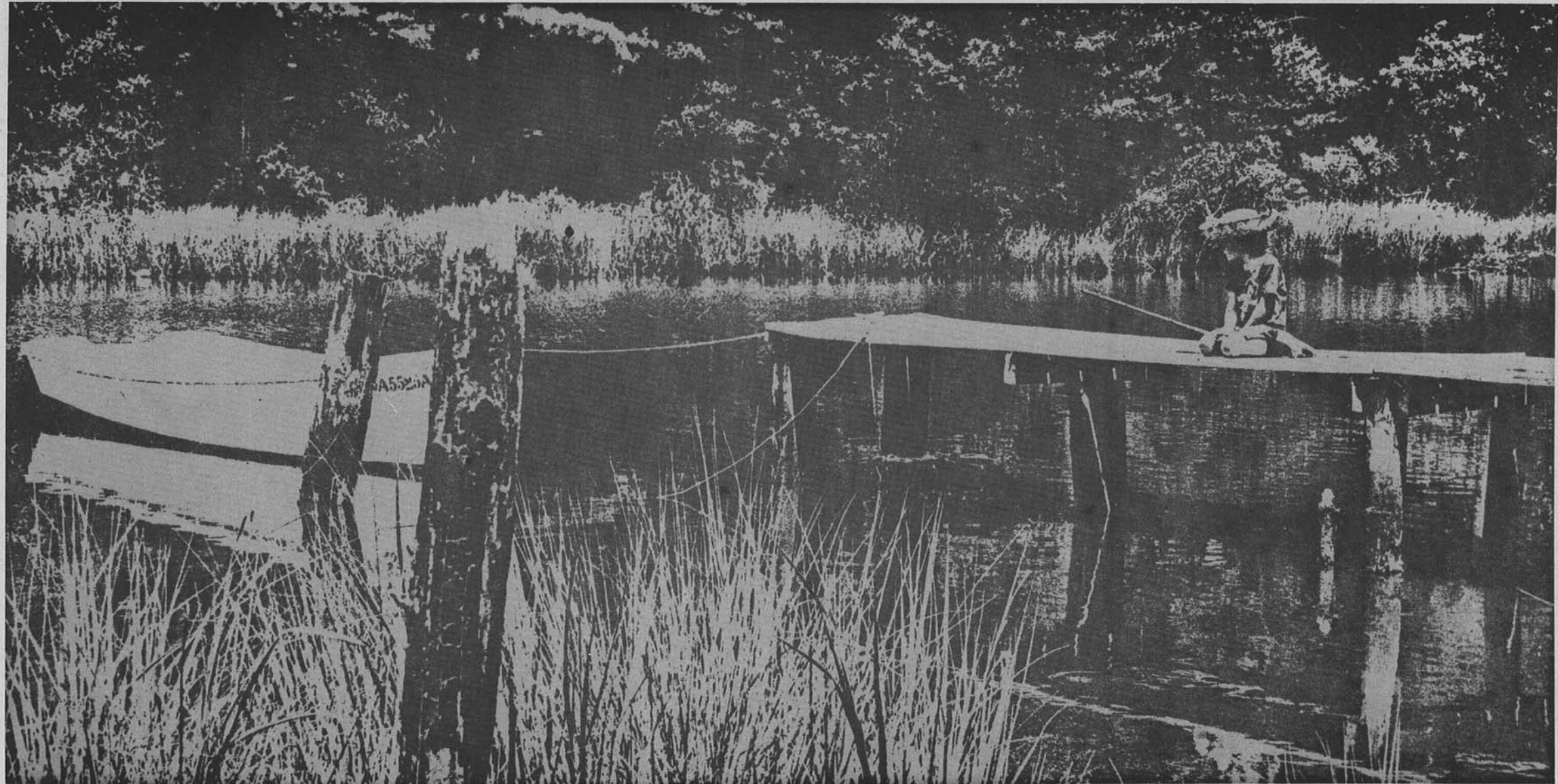


Shoreline Situation Report PRINCE WILLIAM COUNTY, VIRGINIA



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Special Report In Applied Marine Science and Ocean Engineering Number 119 of the

VIRGINIA INSTITUTE OF MARINE SCIENCE

Gloucester Point, Virginia 23062

1976

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CHAPTER 1

Introduction

CHAPTER 1

INTRODUCTION

1.1 PURPOSES AND GOALS

It is the objective of this report to supply an assessment, and at least a partial integration, of those important shoreland parameters and characteristics which will aid the planners and the managers of the shorelands in making the best decisions for the utilization of this limited and very valuable resource. The report gives particular attention to the problem of shore erosion and to recommendations concerning the alleviation of the impact of this problem. In addition, we have tried to include in our assessment a discussion of those factors which might significantly limit development of the shoreline and, in some instances, a discussion of some of the potential or alternate uses of the shoreline, particularly with respect to recreational use, since such information could aid potential users in the perception of a segment of the shoreline.

The basic advocacy of the authors in the preparation of the report is that the use of shorelands should be planned rather than haphazardly developed in response to the short term pressures and interests. Careful planning could reduce the conflicts which may be expected to arise between competing interests. Shoreland utilization in many areas of the country, and indeed in some places in Virginia, has proceeded in a manner such that the very elements which attracted people to the shore have been destroyed by the lack of planning and forethought.

The major man-induced uses of the shorelands are:

- Residential, commercial, or industrial development
- Recreation
- Transportation
- Waste disposal
- Extraction of living and non-living resources

Aside from the above uses, the shorelands serve various ecological functions.

The role of planners and managers is to optimize the utilization of the shorelands and to minimize

the conflicts arising from competing demands. Furthermore, once a particular use has been decided upon for a given segment of shoreland, both the planners and the users want that selected use to operate in the most effective manner. A park planner, for example, wants the allotted space to fulfill the design most efficiently. We hope that the results of our work are useful to the planner in designing the beach by pointing out the technical feasibility of altering or enhancing the present configuration of the shore zone. Alternately, if the use were a residential development, we would hope our work would be useful in specifying the shore erosion problem and by indicating defenses likely to succeed in containing the erosion. In summary our objective is to provide a useful tool for enlightened utilization of a limited resource, the shorelands of the Commonwealth.

Shorelands planning occurs, either formally or informally, at all levels from the private owner of shoreland property to county governments, to planning districts and to the state and federal agency level. We feel our results will be useful at all these levels. Since the most basic level of comprehensive planning and zoning is at the county or city level, we have executed our report on that level although we realize some of the information may be most useful at a higher governmental level. The Commonwealth of Virginia has traditionally chosen to place as much as possible, the regulatory decision processes at the county level. The Virginia Wetlands Act of 1972 (Chapter 2.1, Title 62.1, Code of Virginia), for example provides for the establishment of County Boards to act on applications for alterations of wetlands. Thus, our focus at the county level is intended to interface with and to support the existing or pending county regulatory mechanisms concerning activities in the shorelands zone.

ACKNOWLEDGEMENTS

This report has been prepared and published with funds provided to the Commonwealth by the Office of Coastal Zone Management, National Oceanic and Atmospheric Administration, grant number 04-5-158-50001. The Shoreline Situation Report series was originally developed in the Wetlands/Edges Program of the Chesapeake Research Consortium, Inc., as supported by the Research Applied to National Needs (RANN) program of the National Science Foundation. The completion of this report would have been impossible without the expert services of Beth Marshall, who typed several drafts of the manuscript, Bill Jenkins, who prepared the photographs, and Sam White, who piloted the aircraft on the several photo acquisition and reconnaissance flights. Also we thank the numerous other persons who, through their direct aid, criticisms, and suggestions, have assisted our work.

CHAPTER 2
Approach Used and Elements Considered

CHAPTER 2

APPROACH USED AND ELEMENTS CONSIDERED

2.1 APPROACH TO THE PROBLEM

In the preparation of this report the authors utilized existing information wherever possible. For example, for such elements as water quality characteristics, zoning regulations, or flood hazard, we reviewed relevant reports by local, state, or federal agencies. Much of the desired information, particularly with respect to erosional characteristics, shoreland types, and use was not available, so we performed the field work and developed classification schemes. In order to analyze successfully the shoreline behavior we placed heavy reliance on low altitude, oblique, color, 35 mm photography. We photographed the entire shoreline of each county and cataloged the slides for easy access at VIMS, where they remain available for use. We then analyzed these photographic materials, along with existing conventional aerial photography and topographic and hydrographic maps, for the desired elements. We conducted field inspection over much of the shoreline, particularly at those locations where office analysis left questions unanswered. In some cases we took additional photographs along with the field visits to document the effectiveness of shoreline defenses.

The basic shoreline unit considered is called a subsegment, which may range from a few hundred feet to several thousand feet in length. The end points of the subsegments were generally chosen on physiographic consideration such as changes in the character of erosion or deposition. In those cases where a radical change in land use occurred, the point of change was taken as a boundary point of the subsegment. Segments are groups of subsegments. The boundaries for segments also were selected on physiographic units such as necks or peninsulas between major tidal creeks. Finally, the county itself is considered as a sum of shoreline segments.

The format of presentation in the report follows a sequence from general summary statements for the county (Chapter 3) to tabular segment summaries and finally detailed descriptions and maps for each subsegment (Chapter 4). The purpose in choosing this format was to allow selective use

of the report since some users' needs will adequately be met with the summary overview of the county while others will require the detailed discussion of particular subsegments.

2.2 CHARACTERISTICS OF THE SHORELANDS INCLUDED IN THE STUDY

The characteristics which are included in this report are listed below followed by a discussion of our treatment of each.

- a) Shorelands physiographic classification
- b) Shorelands use classification
- c) Shorelands ownership classification
- d) Zoning
- e) Water quality
- f) Shore erosion and shoreline defenses
- g) Limitations to shore use and potential or alternate shore uses
- h) Distribution of marshes
- i) Flood hazard levels
- j) Shellfish leases and public shellfish grounds
- k) Beach quality

a) Shorelands Physiographic Classification

The shorelands of the Chesapeake Bay System may be considered as being composed of three interacting physiographic elements: the fastlands, the shore and the nearshore. A graphic classification based on these three elements has been devised so that the types for each of the three elements portrayed side by side on a map may provide the opportunity to examine joint relationships among the elements. As an example, the application of the system permits the user to determine miles of high bluff shoreland interfacing with marsh in the shore zone.

For each subsegment there are two length measurements, the shore-nearshore interface or shoreline, and the fastland-shore interface. The two interface lengths differ most when the shore zone is embayed or extensive marsh. On the subsegment maps, a dotted line represents the fastland-shore interface when it differs from the shoreline. The fastland-shore interface length is the base for the fastland statistics.

Definitions:

Shore Zone

This is the zone of beaches and marshes. It is a buffer zone between the water body and the fastland. The seaward limit of the shore zone is the break in slope between the relatively steeper shoreface and the less steep nearshore zone. The approximate landward limit is a contour line representing one and a half times the mean tide range above mean low water (refer to Figure 1). In operation with topographic maps the inner fringe of the marsh symbols is taken as the landward limit.

The physiographic character of the marshes has also been separated into three types (see Figure 2). Fringe marsh is that which is less than 400 feet in width and which runs in a band parallel to the shore. Extensive marsh is that which has extensive acreage projecting into an estuary or river. An embayed marsh is a marsh which occupies a reentrant or drowned creek valley. The purpose in delineating these marsh types is that the effectiveness of the various functions of the marsh will, in part, be determined by type of exposure to the estuarine system. A fringe marsh may, for example, have maximum value as a buffer to wave erosion of the fastland. An extensive marsh, on the other hand, is likely a more efficient transporter of detritus and other food chain materials due to its greater drainage density than an embayed marsh. The central point is that planners, in the light of ongoing and future research, will desire to weight various functions of marshes and the physiographic delineation aids their decision making by denoting where the various types exist. The classification used is:

Beach

Marsh

Fringe marsh, < 400 ft. (122 m) in width
along shores

Extensive marsh

Embayed marsh, occupying a drowned valley
or reentrant

Artificially stabilized

Fastland Zone

The zone extending from the landward limit of the shore zone is termed the fastland. The fastland is relatively stable and is the site of most material development or construction. The

physiographic classification of the fastland is based upon the average slope of the land within 400 feet (122 m) of the fastland - shore boundary. The general classification is:

- Low shore, 20 ft. (6 m) or less of relief; with or without cliff
- Moderately low shore, 20-40 ft. (6-12 m) of relief; with or without cliff
- Moderately high shore, 40-60 ft. (12-18 m) of relief; with or without cliff
- High shore, 60 ft. (18 m) or more of relief; with or without cliff.

Two specially classified exceptions are sand dunes and areas of artificial fill.

Nearshore Zone

The nearshore zone extends from the shore zone to the 12-foot (MLW datum) contour. In the smaller tidal rivers the 6-foot depth is taken as the reference depth. The 12-foot depth is probably the maximum depth of significant sand transport by waves in the Chesapeake Bay area. Also, the distinct drop-off into the river channels begins roughly at the 12-foot depth. The nearshore zone includes any tidal flats.

The class limits for the nearshore zone classifications were chosen following a simple statistical study. The distance to the 12-foot underwater contour (isobath) was measured on the appropriate charts at one-mile intervals along the shorelines of Chesapeake Bay and the James, York, Rappahannock, and Potomac Rivers. Means and standard deviations for each of the separate regions and for the entire combined system were calculated and compared. Although the distributions were non-normal, they were generally comparable, allowing the data for the entire combined system to determine the class limits.

The calculated mean was 919 yards with a standard deviation of 1,003 yards. As our aim was to determine general, serviceable class limits, these calculated numbers were rounded to 900 and 1,000 yards respectively. The class limits were set at half the standard deviation (500 yards) each side of the mean. Using this procedure a narrow nearshore zone is one 0-400 yards in width, intermediate 400-1,400, and wide greater than 1,400.

The following definitions have no legal significance and were constructed for our classification

purposes:

- Narrow, 12-ft. (3.7 m) isobath located < 400 yards from shore
- Intermediate, 12-ft. (3.7 m) isobath 400-1,400 yards from shore
- Wide, 12-ft. (3.7 m) isobath > 1,400 yards from shore

- Subclasses: with or without bars
with or without tidal flats
with or without submerged vegetation

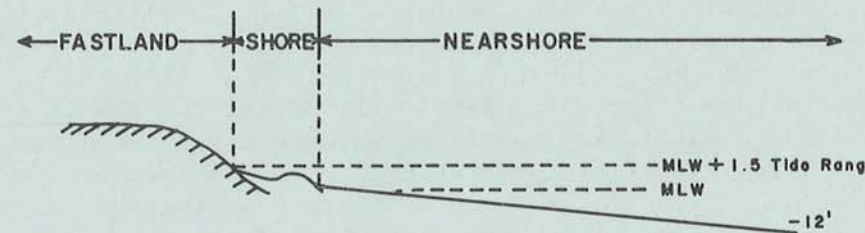


Figure 1

A profile of the three shorelands types.

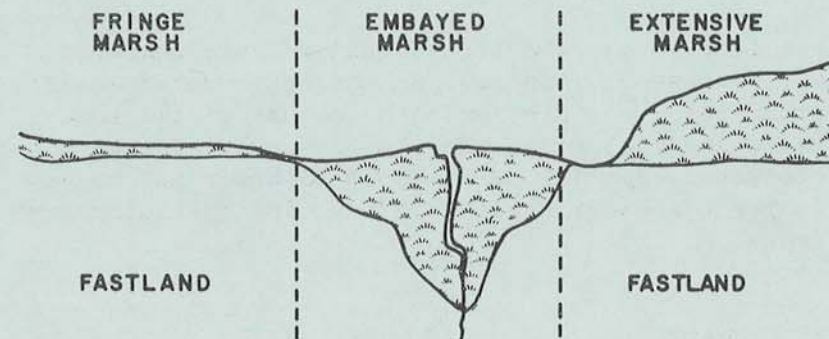


Figure 2

A plan view of the three marsh types.

b) Shorelands Use Classification

Fastland Zone

Residential

Includes all forms of residential use with the exception of farms and other isolated dwellings. In general, a residential area consists of four or more residential buildings adjacent to one another. Schools, churches, and isolated businesses may be included in a residential area.

Commercial

Includes buildings, parking areas, and other land directly related to retail and wholesale trade and business. This category includes small industry and other anomalous areas within the general commercial context. Marinas are considered commercial shore use.

Industrial

Includes all industrial and associated areas. Examples: warehouses, refineries, shipyards, power plants, railyards.

Governmental

Includes lands whose usage is specifically controlled, restricted, or regulated by governmental organizations: e.g., Camp Peary, Fort Story. Where applicable, the Governmental use category is modified to indicate the specific character of the use, e.g., residential, direct military, and so forth.

Recreational and Other Public Open Spaces

Includes designated outdoor recreation lands and miscellaneous open spaces. Examples: golf courses, tennis clubs, amusement parks, public beaches, race tracks, cemeteries, parks.

Preserved

Includes lands preserved or regulated for

environmental reasons, such as wildlife or wild-fowl sanctuaries, fish and shellfish conservation grounds, or other uses that would preclude development.

Agricultural

Includes fields, pastures, croplands, and other agricultural areas.

Unmanaged

Includes all open or wooded lands not included in other classifications:

- a) Open: brush land, dune areas, wastelands; less than 40% tree cover.
- b) Wooded: more than 40% tree cover.

The shoreland use classification applies to the general usage of the fastland area to an arbitrary distance of half mile from the shore or beach zone or to some less distant, logical barrier. In multi-usage areas one must make a subjective selection as to the primary or controlling type of usage. For simplicity and convenience, managed woodlands are classified as "unmanaged, wooded" areas.

Shore Zone

Bathing
Boat launching
Bird watching
Waterfowl hunting

Nearshore Zone

Pound net fishing
Shellfishing
Sport fishing
Extraction of non-living resources
Boating
Water sports

c) Shorelands Ownership Classification

The shorelands ownership classification used has two main subdivisions, private and governmental, with the governmental further divided into

federal, state, county, and town or city. Application of the classification is restricted to fastlands alone since the Virginia fastlands ownership extends to mean low water. All bottoms below mean low water are in State ownership.

d) Water Quality

The water quality sections of this report are based upon data abstracted from Virginia State Water Control Board's publication Water Quality Standards (November, 1974) and Water Quality Inventory (305 (b) Report) (April, 1976).

Additionally, where applicable, Virginia Bureau of Shellfish Sanitation data is used to assign ratings of satisfactory, intermediate, or unsatisfactory. These ratings are defined primarily in regard to number of coliform bacteria. For a rating of satisfactory the maximum limit is an MPN (Most Probable Number) of 70 per 100 ml. The upper limit for fecal coliforms is an MPN of 23. Usually any count above these limits results in an unsatisfactory rating, and, from the Bureau's standpoint, results in restricting the waters from the taking of shellfish for direct sale to the consumer.

There are instances however, when the total coliform MPN may exceed 70, although the fecal MPN does not exceed 23, and other conditions are acceptable. In these cases an intermediate rating may be assigned temporarily, and the area will be permitted to remain open pending an improvement in conditions.

Although the shellfish standards are somewhat more stringent than most of the other water quality standards, they are included because of the economic and ecological impacts of shellfish ground closures. Special care should be taken not to endanger the water quality in existing "satisfactory" areas.

e) Zoning

In cases where zoning regulations have been established the existing information pertaining to the shorelands has been included in the report.

f) Shore Erosion and Shoreline Defenses

The following ratings are used for shore erosion:

- slight or none - less than 1 foot per year
- moderate - - - - 1 to 3 feet per year
- severe - - - - - greater than 3 feet per year

The locations with moderate and severe ratings are further specified as being critical or non-critical. The erosion is considered critical if buildings, roads, or other such structures are endangered.

The degree of erosion was determined by several means. In most locations the long term trend was determined using map comparisons of shoreline positions between the 1850's and the 1940's. In addition, aerial photographs of the late 1930's and recent years were utilized for an assessment of more recent conditions. Finally, in those areas experiencing severe erosion field inspections and interviews were held with local inhabitants.

The existing shoreline defenses were evaluated as to their effectiveness. In some cases repetitive visits were made to monitor the effectiveness of recent installations. In instances where existing structures are inadequate, we have given recommendations for alternate approaches. Furthermore, recommendations are given for defenses in those areas where none currently exist. The primary emphasis is placed on expected effectiveness with secondary consideration to cost.

g) Limitations to Shore Use and Potential or Alternate Shore Uses

In this section we point out specific factors which may impose significant limits on the type or extent of shoreline development. This may result in a restatement of other factors from elsewhere in the report, e.g., flood hazard or erosion, or this may be a discussion of some other factor pertaining to the particular area.

Also we have placed particular attention on the recreational potential of the shore zone. The possible development of artificial beach, erosion protection, etc., influence the evaluation of an area's potential. Similarly, potential alternate shore uses are occasionally noted.

h) Distribution of Marshes

The acreage and physiographic type of the marshes in each subsegment is listed. These estimates of acreages were obtained from topographic maps and should be considered only as approximations. Detailed county inventories of the wetlands are being conducted by the Virginia Institute of Marine Science under the authorization of the Virginia Wetlands Act of 1972 (Code of Virginia 62.1-13.4). These surveys include detailed acreages of the grass species composition within individual marsh systems. In Shoreline Situation Reports of counties that have had marsh inventories, the marsh number is indicated, thus allowing the user of the Shoreline Situation Report to key back to the formal marsh inventory for additional data. The independent material in this report is provided to indicate the physiographic type of marsh land and to serve as a rough guide to marsh distribution, pending a formal inventory. Additional information on wetlands characteristics may be found in Coastal Wetlands of Virginia: Interim Report No. 3, by G.M. Silberhorn, G.M. Dawes, and T.A. Barnard, Jr., SRAMSOE No. 46, 1974, and in other VIMS publications.

i) Flood Hazard Levels

The assessment of tidal flooding hazard for the whole of the Virginia tidal shoreland is still incomplete. However, the United States Army Corps of Engineers has prepared reports for a number of localities which were used in this report. Two tidal flood levels are customarily used to portray the hazard. The Intermediate Regional Flood is that flood with an average recurrence time of about 100 years. An analysis of past tidal floods indicates it to have an elevation of approximately 8 feet above mean water level in the Chesapeake Bay area. The Standard Project Flood level is established for land planning purposes which is placed at the highest probable flood level.

j) Shellfish Leases and Public Grounds

The data in this report show the leased and public shellfish grounds as portrayed in the Virginia State Water Control Board publication "Shellfish growing areas in the Commonwealth of Virginia: Public, leased and condemned,"

November, 1971, and as periodically updated in other similar reports. Since the condemnation areas change with time they are not to be taken as definitive. However, some insight to the conditions at the date of the report are available by a comparison between the shellfish grounds maps and the water quality maps for which water quality standards for shellfish were used.

k) Beach Quality

Beach quality is a subjective judgment based upon considerations such as the nature of the beach material, the length and width of the beach area, and the general aesthetic appeal of the beach setting.

CHAPTER 3
Present Shorelands Situation

CHAPTER 3

PRESENT SHORELANDS SITUATION

3.1 THE SHORELINES OF PRINCE WILLIAM COUNTY

Prince William County is located on the Potomac River approximately sixty-eight river-miles from the mouth at Smith Point. The county is bounded on the south by Stafford County (Chopawamsic Creek), and on the north by Fairfax County (Occoquan Creek). The several major creeks along the shoreline are Chopawamsic Creek, Quantico Creek, Powells Creek, and Neabsco Creek.

There is a total of 57.4 miles of measured shoreline and 44.7 miles of measured fastland in Prince William County. The fastland ranges from low to high shore, with sixty-eight percent being either low or moderately low shore (see Table 1). Generally, the fastlands along the creeks tend to have greater elevations than those along the Potomac River. There are several areas of bluffs along the shoreline.

Almost seventy percent of the shoreline of Prince William County is comprised of marshes, three quarters of which is embayed and extensive marsh. According to the Prince William County Tidal Marsh Inventory, (Virginia Institute of Marine Science, May, 1975), there are approximately 900 acres of tidal marshes in the county, most of which are located along the creeks. These areas, protected by the Virginia Wetlands Act of 1972, are spawning grounds and habitats for various fishes and wildlife, and serve to reduce the erosive energy of winds and waves.

Beaches comprise twenty percent of the county's shoreline. Generally, Prince William County has thin, strip beaches which are often vegetated. There are several areas which do have fair to good beaches, these being mainly at Neabsco and around Freestone Point.

The remaining ten percent of the shore is artificially stabilized, usually bulkhead. Most of these structures are for cosmetic or commercial purposes rather than for shore protection.

According to the Virginia State Water Control

Board's Water Quality Inventory (305(b) Report) (April, 1976), several creeks in Prince William County are experiencing water quality problems. Neabsco Creek is sterile due to a chlorine overdose several years ago. Discharges into several other creeks do not meet the State Water Control Board's Embayment Standards.

No data is included in the Virginia 305(b) Report on the water quality of the Potomac River, since the Maryland state line lies just offshore of the Virginia-owned lands.

Prince William County has a variety of users of its shoreline. Various governments, both local and national, control thirty-five percent of the fastland. Included in these lands are a local park, a National Wildlife Refuge, lands for a proposed regional sewage treatment plant, and various military reservations. The privately owned lands are used for commercial, industrial, and residential purposes. Forty-two percent of the shorelands are unmanaged, wooded.

3.2 SHORELINE EROSION

Although there is no available historical erosion data for Prince William County, recent investigations indicate few areas of significant retreat. Erosion is generally restricted to sites along the Potomac River and near the mouths of several creeks. Only at Chopawamsic Island does erosion seem to be both significant and critical.

Several factors influence the location and rate of erosion for any section of shoreline. Along a major river such as the Potomac, a primary cause of erosion is wind generated waves. In bluff areas, waves attack the exposed cliff base. This process eventually undercuts the base of the cliff, causing the upper portion to slump. The height and growth of waves is controlled by four factors: The overwater distance across which the wind blows (the fetch), the velocity of the wind, the duration of time that the wind blows, and the depth of the water. Prince William County is affected by storms out of the northeast and southeast. Fetches during northeasters range from 2.5 to 6.6 nautical miles and during southeasters from 3.5 to 10.0 nautical miles. The southern end of Chopawamsic Island, having a fetch of 10.0 nautical miles from the southeast, has moderate erosion. Only pilings remain from an earlier attempt at bulkheading this section (see Figure 10).

A house on the northern end of Chopawamsic Island is in eminent danger from continued erosion of the cliff face. Aside from wave actions at the cliff base, the house is endangered by weathering of the cliff due to downhill rain runoff (see Figure 9). Weathering from downhill rain runoff is a major source of erosion in Prince William, affecting bluffs both along the Potomac River and along the numerous inland creeks. Rain runoff washes away exposed cliff sediments, eventually undermining trees located along the cliff. When the trees fall, they carry with them large amounts of soil trapped in their root systems, further compounding the erosion problem.

Many areas which would be vulnerable to erosion have been artificially stabilized, either with bulkheading or riprap. These include Shipping Point (bulkhead), many parts of the Quantico Marine Corps School shoreline (bulkhead and riprap), and Chopawamsic Island (bulkhead). Except for parts of Chopawamsic Island, these structures are

effective and erosion has abated.

In general, erosion in Prince William County is not a significant or critical problem. Many areas suffering from erosion are not presently used and therefore erosion protection is not urgent. Where some type of erosion protection is deemed necessary by the landowner, an important first step is to seek professional advice and guidance. A well conceived and implemented protective structure should abate erosion and cause few, if any, ill effects to neighboring property. In areas where several adjoining landowners have an erosion problem, a joint approach to the problem not only gives better protection but also lessens individual costs. In no case, however, should the landowner build a protective structure without professional advice and guidance.

3.3 ALTERNATE SHORE USE

Alternate shore uses for the shorelands of Prince William County are limited by both physical geography and man. Man's control and use of the shoreline, be it residential, industrial, commercial, or governmental, has a great impact not only on those particular sections but also on the adjacent shorelands. Present use of an area has much impact on the philosophy of use and development of neighboring shorelands. Similarly, the physical geography of the area, its vulnerability to erosion and flooding, its topography and its proximity to marshes contribute to the desirability of various land uses. Also, the development policy of the county and its zoning regulations act to stimulate or prohibit development in certain areas of the county.

Prince William County's land development policy for 1974-1980 includes a variety of existing and potential uses for the shorelands (Existing U.S. Military Reservations are not subject to any county development plans.). Industry is expected to be located between Quantico Creek and Powells Creek (The Vepco substation is already operating at the mouth of Quantico Creek). Residential and commercial areas should eventually locate all along the interior of the fastland, concentrating along Belmont Bay and the Occoquan River. Only isolated areas from Neabsco Creek to Occoquan River are set aside for agricultural use, community facilities, or as critical environment areas (The creek shorelines are critical environment areas). Some commercial areas are to be located along Neabsco Creek and at Occoquan.

There are few public recreational areas in the county. The county has public boat landings along several creeks. The Veterans Memorial Park is located on seventy-eight acres along Marumsco Creek and is owned by Prince William County. The park has facilities for low intensity recreational uses. There is a wildlife refuge (Department of the Interior) situated from Farm Creek to the mouth of Neabsco Creek. These lands will probably support some low intensity recreational usage. No other sites have been set aside for public recreation, though several areas could be so developed. A section in front of River Bend Estates on the Occoquan River could be easily developed as a picnic area, with boat access to the river. Also, an area of wooded land and marsh near Georgetown

Village on Powells Creek would make a nice public park with nature trails, camping areas, and picnic grounds. Other wooded lands generally do not have adequate access for public use and severe topography (high or moderately high bluffs along the shore) lessens any potential water related use.



FIGURE 3



FIGURE 4

FIGURE 3: Marina facilities on Neabsco Creek, north of the railroad bridge (Subsegment 2B).

FIGURE 4: The Bayside Park shoreline (Subsegment 2A). Many of the structures are below elevations of ten feet and could be susceptible to flooding.

FIGURE 5: Bluffs and beach at Freestone Point (Subsegment 2B). The bluffs are composed primarily of rock and can withstand most erosive forces. The beach on the left side of the photo is one of the nicest in the county.



FIGURE 5

FIGURE 6: Embayed marsh fronting new development on Quantico Creek (Segment 4). Residential buildups behind valuable marsh areas are environmentally sound if proper precautions are taken to ensure there are no harmful effects on the marsh system.

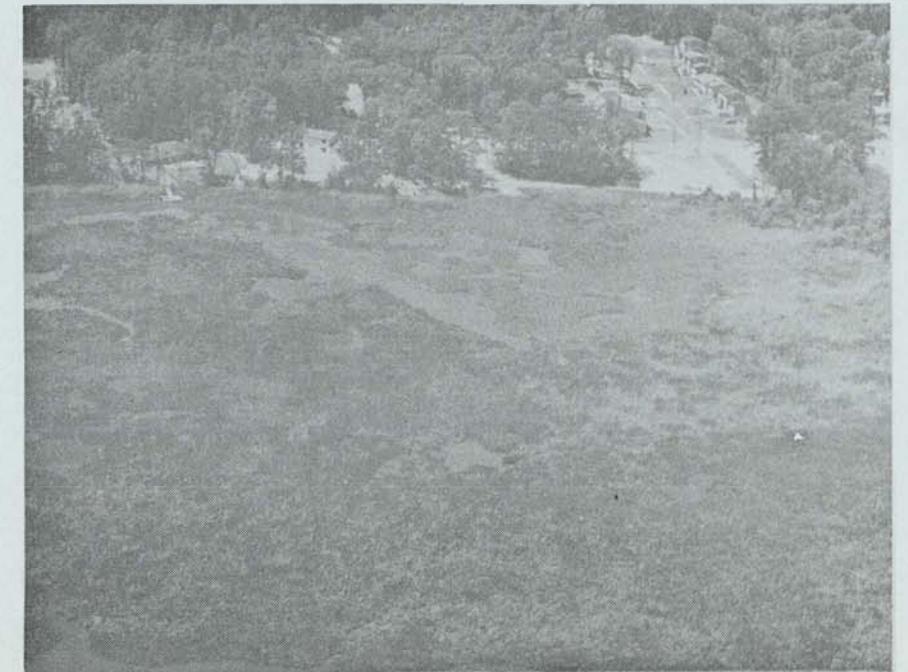


FIGURE 6

FIGURE 7: Vulnerable bluffs north of the VEPCO substation (Subsegment 3B). The bluffs will probably continue to erode at a slight to moderate rate until the area is artificially stabilized.

FIGURE 8: VEPCO substation on Possum Point (Subsegment 3B). The bulkhead is vertical steel sheet pile back-filled with a stone and sand aggregate.

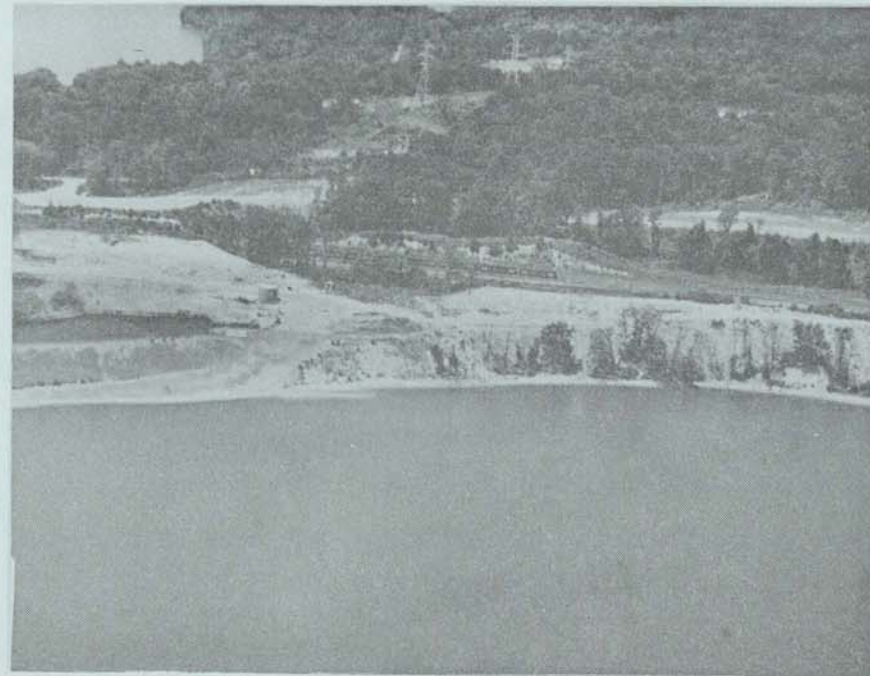


FIGURE 7

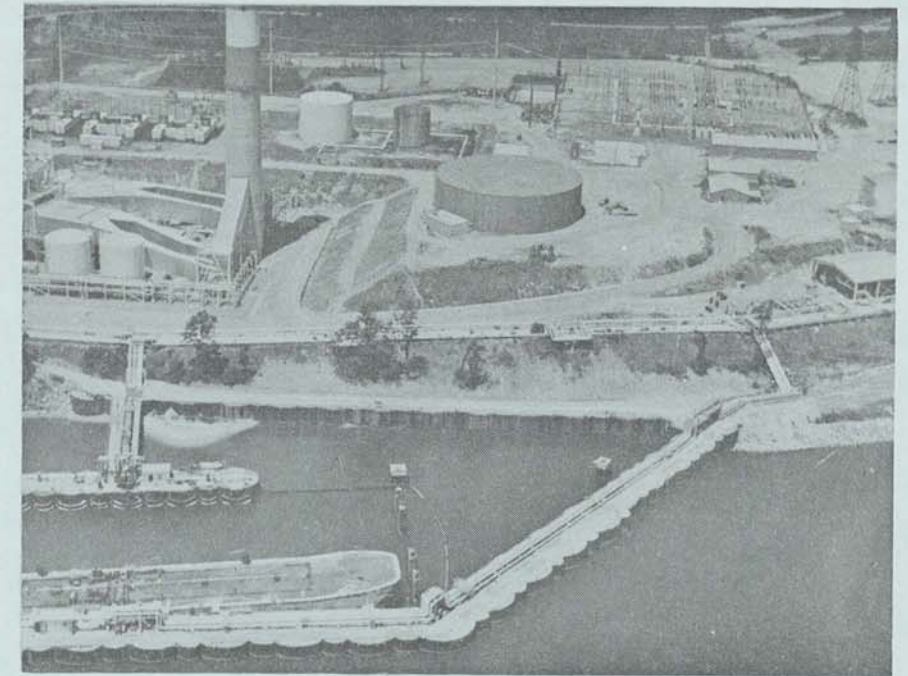


FIGURE 8

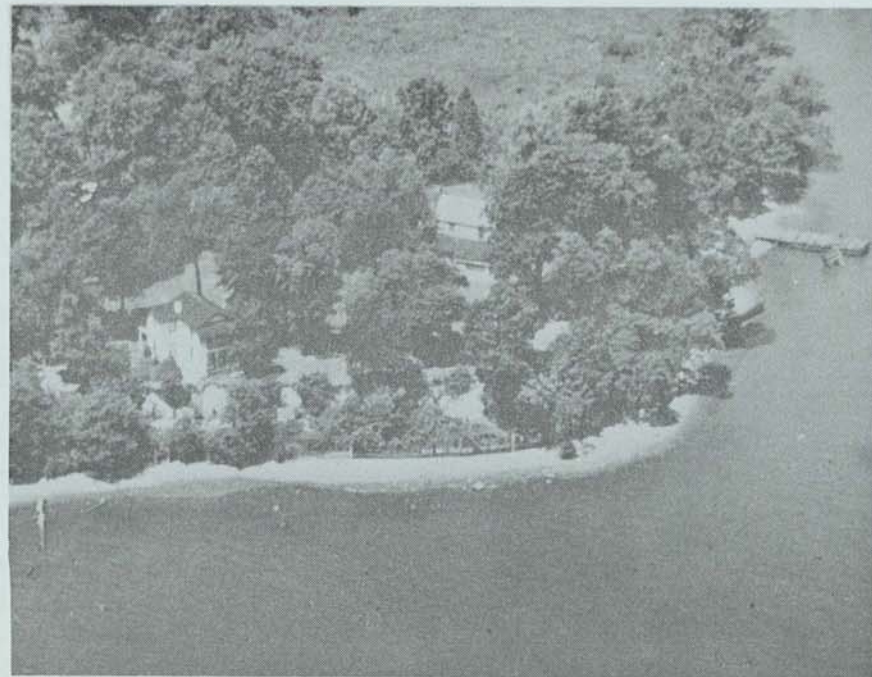


FIGURE 9

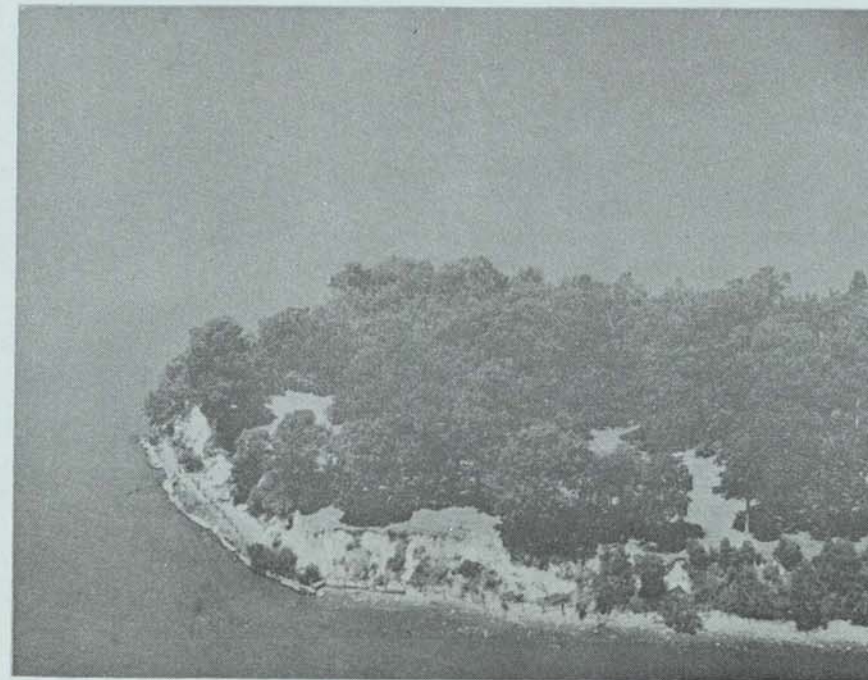
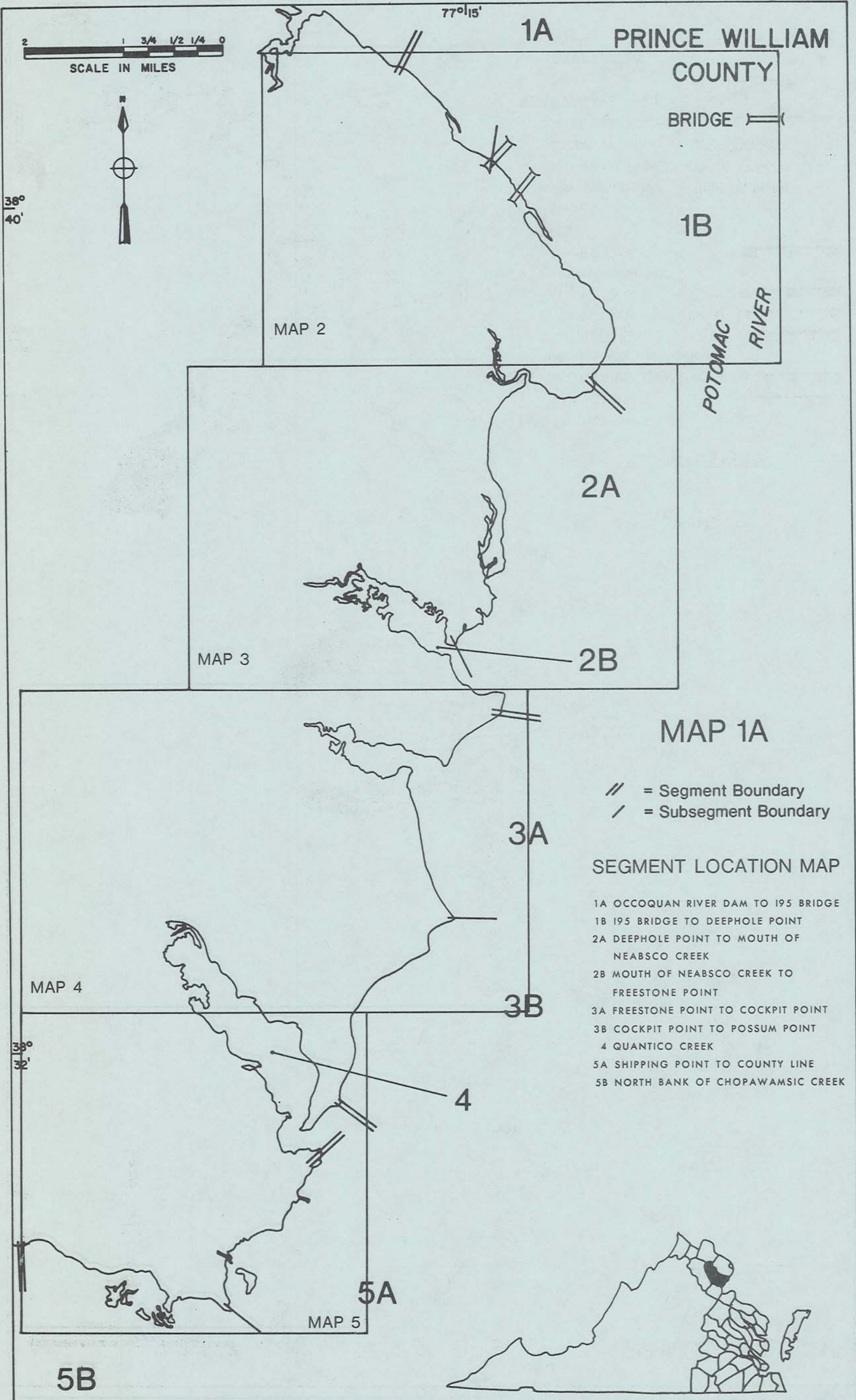


FIGURE 10

FIGURE 9: North end of Chopawamsic Island (Subsegment 5A). The house in the foreground is endangered by continued erosion of the bluff. Two sets of bulkhead seem to be ineffective in combatting the erosion problem. Downhill rain runoff is also a major factor in the erosion of the cliff.

FIGURE 10: South end of Chopawamsic Island (Subsegment 5A). The bulkheading of this area has failed, leaving the cliffs exposed to wind generated waves from the southeast.



2 1 3/4 1/2 1/4 0
SCALE IN MILES



36°
40'

77°15'

1A PRINCE WILLIAM COUNTY

BRIDGE

1B

POTOMAC RIVER

MAP 2

2A

MAP 3

2B

MAP 1A

- // = Segment Boundary
- / = Subsegment Boundary

SEGMENT LOCATION MAP

- 1A OCCOQUAN RIVER DAM TO 195 BRIDGE
- 1B 195 BRIDGE TO DEEPHOLE POINT
- 2A DEEPHOLE POINT TO MOUTH OF NEABSCOC CREEK
- 2B MOUTH OF NEABSCOC CREEK TO FREESTONE POINT
- 3A FREESTONE POINT TO COCKPIT POINT
- 3B COCKPIT POINT TO POSSUM POINT
- 4 QUANTICO CREEK
- 5A SHIPPING POINT TO COUNTY LINE
- 5B NORTH BANK OF CHOPAWAMSIK CREEK

MAP 4

3A

3B

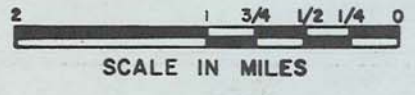
4

36°
32'

5A

MAP 5

5B



38°
40'

77°15'

PRINCE WILLIAM COUNTY

BRIDGE

1B

POTOMAC RIVER

1A

2A

2B

3A

MAP 1B

SHORELANDS TYPES

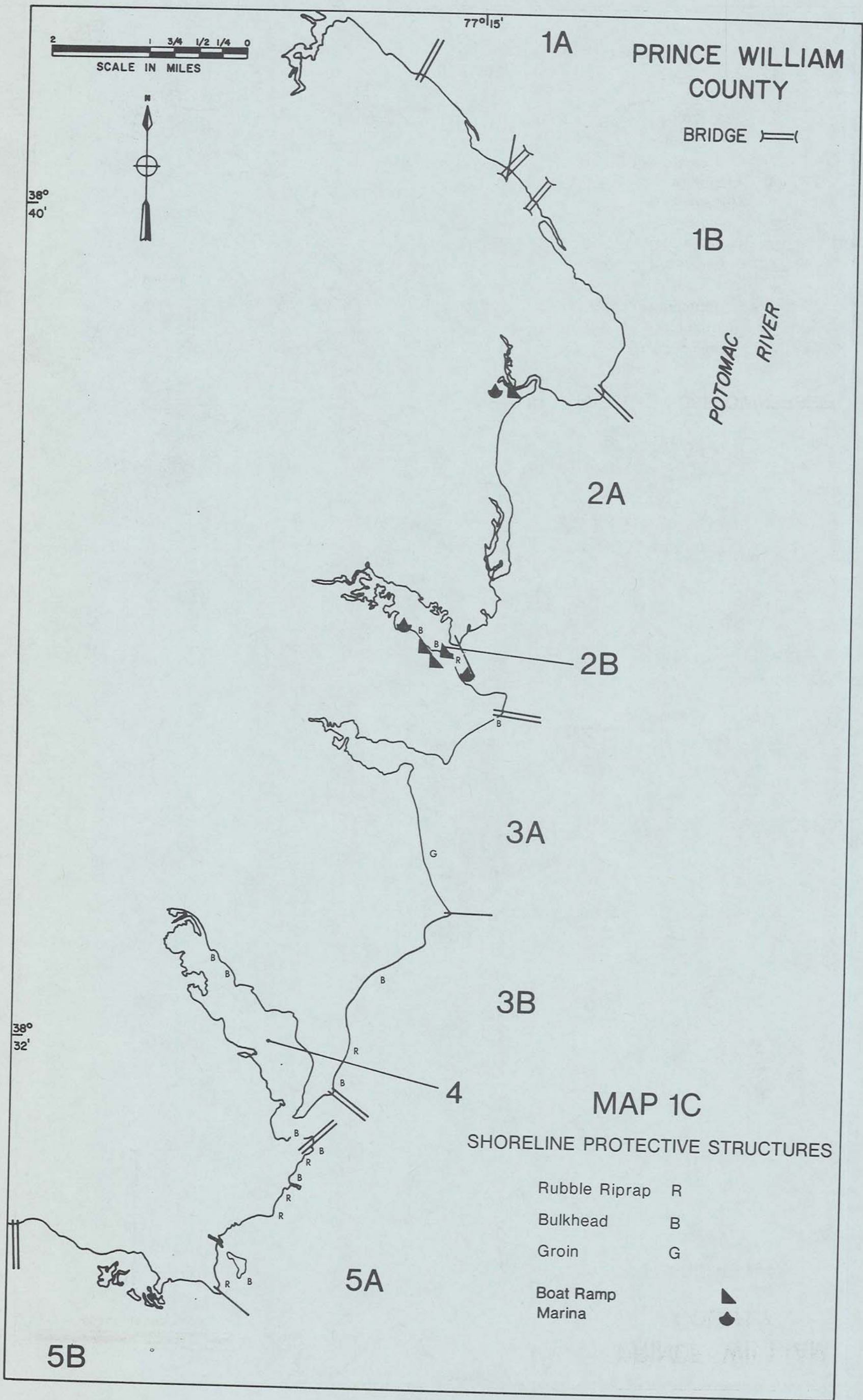
- FASTLAND
 - Low Shore
 - Moderately Low Shore
 - Moderately Low Shore with Bluff
 - Moderately High Shore
 - High Shore
 - High Shore with Bluff
- SHORE
 - Beach
 - Fringe Marsh
 - Extensive Marsh
 - Embayed Marsh
 - Artificially Stabilized
- NEARSHORE
 - Narrow
 - Intermediate
 - Wide

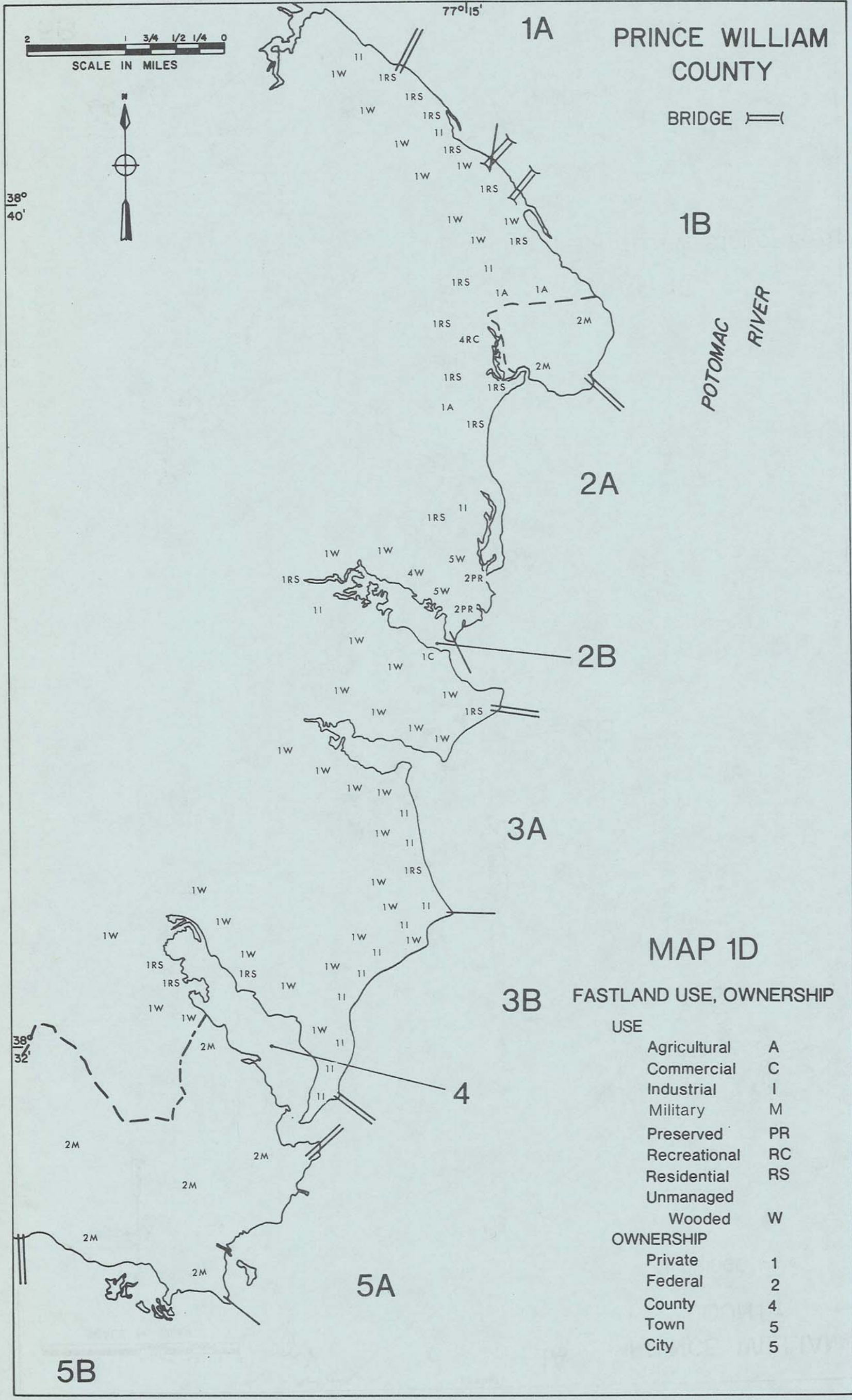
38°
32'

4

5A

5B





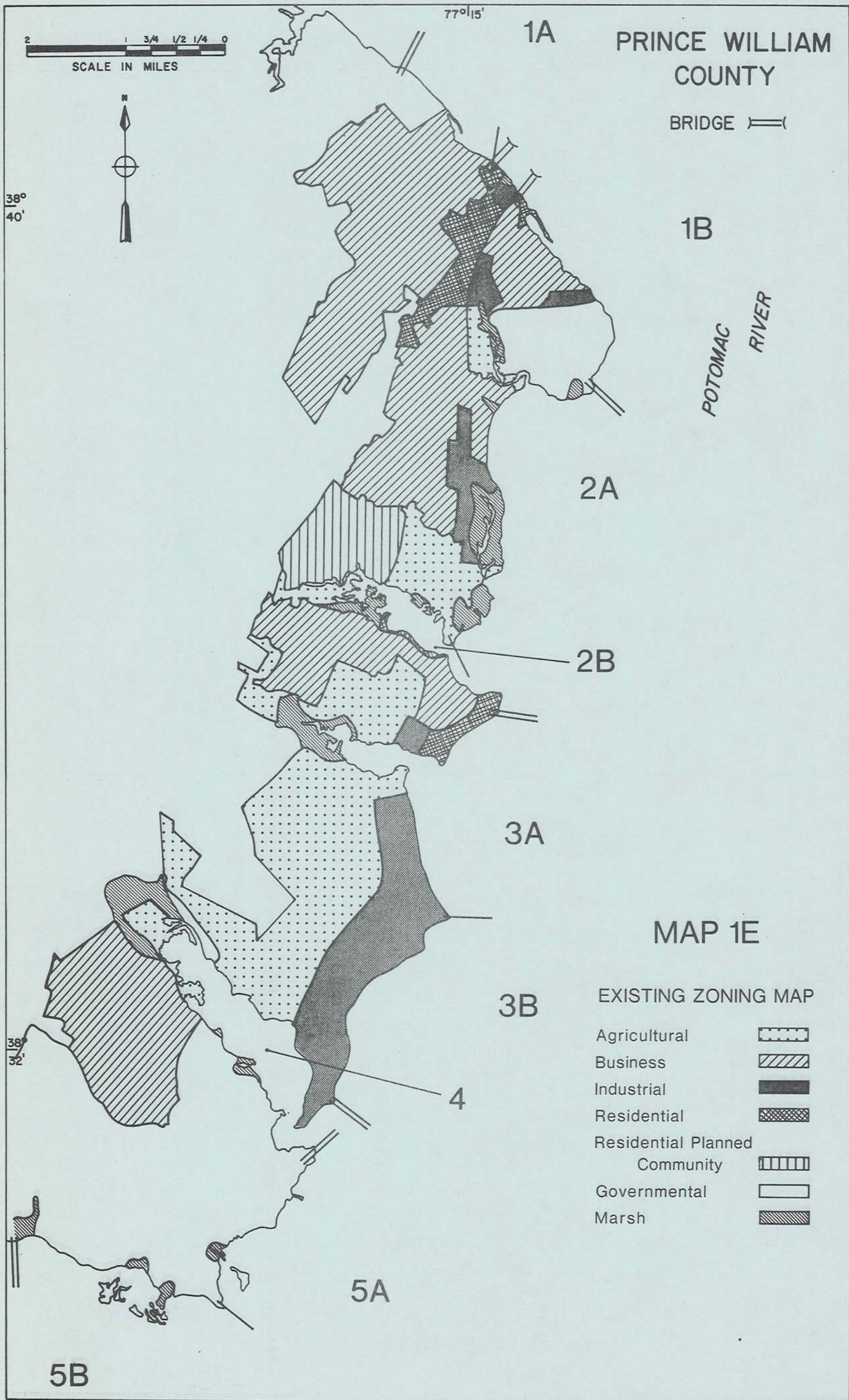


TABLE 1. SUMMARY OF PRINCE WILLIAM COUNTY SHORELANDS PHYSIOGRAPHY, FASTLAND USE AND OWNERSHIP (STATUTE MILES)

Physiographic, use, and ownership classifi- cation	SHORELANDS PHYSIOGRAPHY													SHORELANDS USE								OWNERSHIP				TOTAL MILES		
	FASTLAND						SHORE					NEARSHORE																
	LOW SHORE	MODERATELY LOW SHORE	MODERATELY LOW SHORE WITH BLUFF	MODERATELY HIGH SHORE	HIGH SHORE	HIGH SHORE WITH BLUFF	ARTIFICIALLY STABILIZED	BEACH	FRINGE MARSH	EMBAYED MARSH	EXTENSIVE MARSH	NARROW	INTERMEDIATE	WIDE	COMMERCIAL	GOVERNMENTAL	INDUSTRIAL	PRESERVED	RECREATIONAL	RESIDENTIAL	UNMANAGED, UNWOODED	UNMANAGED, WOODED	PRIVATE	FEDERAL	COUNTY	CITY	FASTLAND	SHORELINE
1A		1.4		0.4	0.6		1.3	0.1	0.9			R I V E R		0.5		0.4			1.1		0.3	2.3					2.3	2.3
1B	1.9			0.8	0.2	0.2	0.6	1.7	0.3	0.2	1.0	R I V E R			1.2				0.6	0.2	1.1	1.9	1.2			3.1	3.8	
2A	7.7	0.2					1.3	0.5	1.1	6.4	5.5				1.8	0.4	1.5	0.5	1.2		2.5	4.1	3.3	0.5		7.9	14.8	
2B	1.2	1.2		1.6	1.2	0.3	0.2	1.1	2.3	6.2				0.6		0.2			0.2		4.4	4.0		0.3	1.1	5.4	9.8	
3A	2.0	1.7		1.3	1.2	0.4	0.1	2.2	1.9	2.6			1.3			1.0			0.5		5.2	6.7				6.7	6.8	
3B	0.3	0.4		0.7	0.7	0.6	0.6	1.9		0.1			2.5			0.9					1.8	2.7				2.7	2.5	
4	1.0	6.1	0.3	1.3	0.8	0.3	0.3	2.8	2.7	3.4	1.9	C R E E K			2.8	2.3			1.1		3.4	6.9	2.8			9.6	11.1	
5A	0.6	2.7	0.1				1.4	1.4		0.4	0.4	1.0	1.6						0.5			0.5	2.8			3.4	3.6	
5B	1.5	0.6		0.8	0.8				1.2	1.5		C R E E K			3.6								3.6			3.6	2.7	
TOTAL	16.2	14.3	0.4	6.9	5.5	1.8	5.8	11.7	10.4	20.8	8.8	4.8	1.6	6.2	1.1	12.2	5.2	1.5	0.5	5.2	0.2	18.7	29.1	13.7	0.8	1.1	44.7	57.4
% of FASTLAND	36%	32%	1%	15%	12%	4%									2%	27%	12%	3%	1%	12%	1%	42%	65%	31%	2%	2%	100%	
% of SHORELINE							10%	20%	18%	36%	15%	8%	3%	11%														100%

CHAPTER 4

- 4.1 Table of Subsegment Summaries
- 4.2 Segment and Subsegment Descriptions
- 4.3 Segment and Subsegment Maps

TABLE 2. SHORELINE SITUATION REPORT SUBSEGMENT SUMMARIES, PRINCE WILLIAM COUNTY, VIRGINIA

SUBSEGMENT	SHORELANDS TYPE	SHORELANDS USE	OWNERSHIP	ZONING	FLOOD HAZARD	BEACH QUALITY	SHORE EROSION SITUATION	ALTERNATE SHORE USE
1A OCCOQUAN RIVER DAM TO THE I-95 BRIDGE 2.3 miles (2.3 miles of fastland)	FASTLAND: Moderately low shore 59%, moderately high shore 16%, and high shore 25%. SHORE: Artificially stabilized 56%, beach 5%, and fringe marsh 39%. RIVER: Narrow and shallow.	FASTLAND: Commercial 20%, industrial 18%, residential 47%, and unmanaged, wooded 15%. SHORE: Commercial use (marinas). RIVER: Mostly unused except by marina traffic.	Private.	Business and residential.	Low. This area is relatively protected from storm winds and waves. The Occoquan River Dam protects the area from upland rains.	Poor. The only beach is located under the I-95 bridge.	No data. The area appears stable. There are approximately 6,800 feet of bulkheading located at the several marinas in this subsegment.	Low. The present use of the shoreline restricts alternate development.
1B I-95 BRIDGE TO DEEPHOLE POINT 3.8 miles (3.1 miles of fastland)	FASTLAND: Low shore 62%, moderately high shore 26%, high shore 6%, and high shore with bluff 6%. SHORE: Artificially stabilized 14%, beach 46%, fringe marsh 9%, embayed marsh 6%, and extensive marsh 25%. RIVER: The Occoquan River had controlling depths of 4 feet in 1971.	FASTLAND: Residential 19%, unmanaged, unwooded 7%, unmanaged, wooded 35%, and governmental (transmitting and receiving station) 39%. SHORE: Some waterfowl hunting in the marshes, but mostly unused. RIVER: Sport boating and fishing.	Federal 39% and private 61%.	Government, business, residential and industrial.	Low to moderate. The majority of the shoreline has elevations of 10 feet. Part of the Military Reservation is subject to flooding during periods of abnormally high water.	Fair to poor. The beaches in this subsegment are wide and often vegetated.	No data. The area appears stable. There are approximately 2,000 feet of effective rubble riprap located at the Military Reservation, and 800 feet of cosmetic bulkheading northwest of the Route 1 bridge.	The unmanaged, wooded area located in front of River Bend Estates has the possibility of becoming a low intensity recreational area.
2A DEEPHOLE POINT TO THE MOUTH OF NEABSCO CREEK 14.8 miles (7.9 miles of fastland)	FASTLAND: Low shore 97% and moderately low shore 3%. SHORE: Artificially stabilized 9%, beach 3%, fringe marsh 8%, embayed marsh 43%, and extensive marsh 37%. NEARSHORE: Wide 27%. The remainder of the subsegment is located along Marumsco and Farm Creeks.	FASTLAND: Industrial 5%, preserved 19%, recreational 7%, residential 15%, unmanaged, wooded 32%, and governmental (U.S. Government Transmitting and Receiving Station) 22%. SHORE: Some waterfowl hunting in the marshes, but mostly unused. NEARSHORE: Sport boating and fishing.	Private 52%, federal 42%, and county 6%.	Agricultural, business, industrial and governmental.	Low to moderate, critical. Many structures at Bayside Park are below the 10-foot contour, and are subject to flooding during periods of abnormally high water.	Poor. The Featherstone Shores area has narrow, strip beaches which are often vegetated. Various other areas have small, pocket beaches.	No data. The area appears stable. There are approximately 3,600 feet of rubble riprap located from Deephole Point to the mouth of Marumsco Creek. Bayside Park and Featherstone Shores have approximately 3,400 feet of bulkheading and several groins. The marina north of Featherstone Shores has approximately 300 feet of cosmetic bulkheading.	Low. This subsegment already has a county owned recreational park and a wildlife refuge along the shoreline. Little alternate use seems necessary for the unused, wooded lands located in the subsegment.
2B MOUTH OF NEABSCO CREEK TO FREESTONE POINT 9.8 miles (5.4 miles of fastland)	FASTLAND: Low shore 22%, moderately low shore 22%, moderately high shore 29%, high shore 22%, and high shore with bluff 5%. SHORE: Artificially stabilized 1%, beach 11%, fringe marsh 24%, and embayed marsh 63%. NEARSHORE: Wide 11%. The remainder of the subsegment is located along Neabsco Creek.	FASTLAND: Commercial 12%, industrial 3%, residential 4%, and unmanaged, wooded 81%. SHORE: Some waterfowl hunting in the marshes, but mostly unused. NEARSHORE: Sport boating and fishing.	Private 73%, city 21%, and county 6%.	Agricultural, residential, and business.	Low. All structures are above 10-foot elevations. Only the marsh areas are subject to flooding.	Poor to good. The beaches between Neabsco and Freestone Point are narrow and often vegetated. Neabsco and Freestone Point have wide, clean beaches.	No data. The majority of the subsegment appears to be stable with the exception of Freestone Point. These bluffs are experiencing minor erosion due to downhill rain runoff and undercutting of the cliff base. There are approximately 1,200 feet of stabilized shore, the majority of which is located at the marina on the south bank of the creek.	Low. Although 54% of the shoreline is presently unused, development here would be costly because of the lack of access to the area.
3A FREESTONE POINT TO COCKPIT POINT 6.8 miles (6.7 miles of fastland)	FASTLAND: Low shore 31%, moderately low shore 26%, moderately high shore 20%, high shore 18%, and high shore with bluff 5%. SHORE: Artificially stabilized 3%, beach 32%, fringe marsh 27%, and embayed marsh 38%. NEARSHORE: Narrow 18% and wide 16%. The remainder of the subsegment is located along Powells Creek.	FASTLAND: Industrial 15%, residential 8%, and unmanaged, wooded 77%. SHORE: Some waterfowl hunting in the marshes, bathing and strolling along the beaches. NEARSHORE: Sport boating and fishing.	Private.	Industrial, agricultural, and residential.	Low. The majority of the subsegment has elevations of 20 feet and over.	Fair to good. There are long stretches of wide, clean beaches in this subsegment.	No data. The area appears stable. There is one groin in the subsegment, which appears to be effective.	Low. Two areas have development potential, although any construction should ensure against adding pollutants to the waters. A low intensity recreational park would be possible along the shorelands near Georgetown Village.
3B COCKPIT POINT TO POSSUM POINT 2.5 miles (2.7 miles of fastland)	FASTLAND: Low shore 10%, moderately low shore 14%, moderately high shore 26%, high shore 27%, and high shore with bluff 23%. SHORE: Artificially stabilized 22%, beach 75%, and embayed marsh 3%. NEARSHORE: Narrow.	FASTLAND: Industrial 34% and unmanaged, wooded 66%. SHORE: Mostly unused. NEARSHORE: Sport boating and fishing.	Private.	Industrial.	Low. The majority of the subsegment has elevations of at least 20 feet.	Poor to fair. There are several areas with fairly wide beaches in this subsegment.	No data. The majority of the area appears stable. The bluffs north of the power plant are experiencing erosion due to downhill rain runoff and undercutting of the base by wind and wave actions. There are approximately 3,000 feet of stabilization at the substation site near Possum Point.	Low. For the 66% of the shorelands which are presently unused, development depends upon access across the railroad tracks.

TABLE 2 (Con't.).

SUBSEGMENT	SHORELANDS TYPE	SHORELANDS USE	OWNERSHIP	ZONING	FLOOD HAZARD	BEACH QUALITY	SHORE EROSION SITUATION	ALTERNATE SHORE USE
4 QUANTICO CREEK 11.1 miles (9.8 miles of fastland)	FASTLAND: Low shore 10%, moderately low shore 63%, moderately low shore with bluff 3%, moderately high shore 14%, high shore 8%, and high shore with bluff 3%. SHORE: Artificially stabilized 3%, beach 25%, fringe marsh 24%, embayed marsh 30%, and extensive marsh 17%. CREEK: Quantico Creek is too narrow and shallow for classification.	FASTLAND: Industrial 24%, residential 12%, unmanaged, wooded 35%, and governmental (Quantico Marine Corps School) 29%. SHORE: Waterfowl hunting in the marshes, bathing and strolling along the beaches. CREEK: Some sport boating and fishing.	Federal 29% and private 71%.	Agricultural and commercial.	Low. The majority of the segment has elevations of 20 feet and is not subject to flooding.	Poor. There are only narrow, strip beaches in this segment.	No data. The majority of the area appears stable although several bluff areas are experiencing minor erosion due to downhill rain runoff. There are approximately 1,800 feet of effective bulkheading in this subsegment.	Low. The area near the town of Dumfries could be developed as a low intensity recreational park. Other alternate uses for this segment are limited due to existing use and ownership.
5A SHIPPING POINT TO COUNTY LINE 3.6 miles (3.4 miles of fastland)	FASTLAND: Low shore 17%, moderately low shore 80%, and moderately low shore with bluff 3%. SHORE: Artificially stabilized 40%, beach 40%, embayed marsh 10%, and extensive marsh 10%. NEARSHORE: Narrow 27% and intermediate 44%. The remainder of the subsegment is located along the marsh creek and the sheltered side of Chopawamsic Island.	FASTLAND: Residential 16% and governmental (U.S. Marine Corps facilities and airstation) 84%. SHORE: Mostly unused except for access to boat docks. NEARSHORE: Sport boating and fishing.	Federal 84% and private 16%.	Governmental and agricultural.	Low. The majority of the area has elevations of at least 20 feet and is not subject to flooding.	Poor. The subsegment has narrow, strip beaches.	No data. The area appears stable with the exception of sections of Chopawamsic Island. The bluffs here are experiencing minor erosion due to downhill rain runoff and undercutting of the cliff base. One house on the north end of the island is endangered by erosion.	Low. The present use and ownership of this subsegment precludes alternate development.
5B CHOPAWAMSI CREEK 2.7 miles (3.7 miles of fastland)	FASTLAND: Low shore 42%, moderately low shore 16%, moderately high shore 21%, and high shore 21%. SHORE: Fringe marsh 46% and embayed marsh 54%. CREEK: The entire subsegment is located along Chopawamsic Creek, which is too narrow and shallow for classification.	FASTLAND: Entirely governmental (U.S. Marine Corps Base). SHORE: Mostly unused. CREEK: Sport boating and fishing.	Federal.	Government Military Reservation.	Low. The majority of the shoreline has elevations of at least 10 feet. Only the marshes are subject to flooding.	There are no beaches in this subsegment.	No data. The area appears stable. There are no endangered or shore protective structures.	None. The present government ownership and use of this subsegment prohibits alternate development.

SUBSEGMENT 1A

OCCOQUAN RIVER DAM TO I-95 BRIDGE

(Map 2)

EXTENT: 12,200 feet (2.3 mi.) of shoreline from the Occoquan River Dam to the I-95 bridge. This subsegment also has 12,200 feet (2.3 mi.) of fastland.

SHORELANDS TYPE

FASTLAND: Moderately low shore 59% (1.4 mi.), moderately high shore 16% (0.4 mi.), and high shore 25% (0.6 mi.).

SHORE: Artificially stabilized 56% (1.3 mi.), beach 5% (0.1 mi.), and fringe marsh 39% (0.9 mi.).

RIVER: The entire subsegment is located along the Occoquan River, which is too narrow and shallow for classification.

SHORELANDS USE

FASTLAND: Commercial 20% (0.5 mi.), industrial 18% (0.4 mi.), residential 47% (1.1 mi.), and unmanaged, wooded 15% (0.3 mi.).

SHORE: Commercial use (marinas).

RIVER: Some sport boating but mostly unused.

SHORELINE TREND: The shoreline trends basically NW - SE in this subsegment.

OWNERSHIP: Entirely private.

ZONING: Business and residential.

FLOOD HAZARD: Low. The shorelands along this section of the Occoquan River are relatively protected from storm winds and waves. Though some structures near Occoquan are below 10-foot elevations, none seem endangered by flood waters. The Occoquan River Dam protects the area from flooding due to upland rains.

BEACH QUALITY: Poor. The only beach is located under the I-95 bridge.

SHORE EROSION SITUATION

EROSION RATE: No data. The area appears to be stable.

ENDANGERED STRUCTURES: None.

SHORE PROTECTIVE STRUCTURES: There are

approximately 6,800 feet of bulkheading in this subsegment, located at several marinas and along most of the Occoquan shoreline. All structures seem to be effective.

OTHER SHORE STRUCTURES: There are numerous piers and boat docks located at the marinas in this subsegment.

SHORE USE LIMITATIONS: The shorelands in this subsegment are actively utilized. Little or no new development (besides isolated structures) could take place here.

ALTERNATE SHORE USE: Low. The present use of the shorelands prevents development of alternate uses.

MAPS: USGS, 7.5 Min.Ser. (Topo.), OCCOQUAN, Va. Quadr., 1966, pr. 1971;
USGS, 7.5 Min.Ser. (Topo.), FORT BELVOIR, Va. Quadr., 1965, pr. 1971.
C&GS, #560, 1:40,000 scale, POTOMAC RIVER, Mattawoman Creek to Georgetown, 1971.

PHOTOS: Aerial-VIMS 9Sep76 PW-1A/223-245.

SUBSEGMENT 1B

I-95 BRIDGE TO DEEPHOLE POINT

(Maps 2 and 3)

EXTENT: 20,000 feet (3.8 mi.) of shoreline on the Occoquan River, from the I-95 bridge to Deephole Point. The subsegment also includes 16,200 feet (3.1 mi.) of fastland.

SHORELANDS TYPE

FASTLAND: Low shore 62% (1.9 mi.), moderately high shore 26% (0.8 mi.), high shore 6% (0.2 mi.), and high shore with bluff 6% (0.2 mi.).

SHORE: Artificially stabilized 14% (0.6 mi.), beach 46% (1.7 mi.), fringe marsh 9% (0.3 mi.), embayed marsh 6% (0.2 mi.), and extensive marsh 25% (1.0 mi.).

RIVER: The Occoquan River has a dredged channel which had controlling depths of 4 feet in 1971.

SHORELANDS USE

FASTLAND: Residential 19% (0.6 mi.), unmanaged, unwooded 7% (0.2 mi.), unmanaged, wooded 35% (1.1 mi.), and governmental (U.S. Government Transmitting and Receiving Station) 39% (1.2 mi.).

SHORE: Mostly unused, some waterfowl hunting in the marshes.

RIVER: Sport boating and fishing.

SHORELINE TREND: The shoreline trends basically NW - SE in this subsegment. The fetch at Deephole Point is SE - 3.5 nautical miles.

OWNERSHIP: Federal 39% and private 61%.

ZONING: Governmental, business, residential, and industrial.

FLOOD HAZARD: Low to moderate. Most areas of the shoreline have elevations of at least 10 feet. However, part of the U.S. Military Reservation south of Taylors Point is susceptible to flooding during periods of abnormally high water.

BEACH QUALITY: Fair to poor. The beaches in this subsegment are fairly wide and often vegetated. Of the 1.7 miles of beach, 1.2

miles are located along the shoreline of the U.S. Military Reservation, thereby restricting public access and usage.

SHORE EROSION SITUATION

EROSION RATE: No data. The area appears to be stable.

ENDANGERED STRUCTURES: None.

SHORE PROTECTIVE STRUCTURES: There are approximately 2,000 feet of effective rubble riprap located along the shoreline of the Military Reservation. Northwest of the Route 1 bridge, there are approximately 800 feet of effective bulkhead. This structure is mainly for cosmetic purposes as erosion is not a significant problem here.

OTHER SHORE STRUCTURES: There is a boat ramp adjoining the bulkhead at the Route 1 bridge, and a pier at the northern boundary of the Military Reservation.

SHORE USE LIMITATIONS: Thirty-nine percent of the shorelands in this subsegment are part of a U.S. Military Reservation. No development, except by the government is possible for this area. The area from the I-95 bridge to the government owned lands is heavily utilized in the interior, but the shorelands are largely unused. These shorelands are zoned for business and some residential use.

ALTERNATE SHORE USE: The unmanaged, unwooded area located in front of the River Bend Estates has possibility for becoming a low intensity recreational area.

MAPS: USGS, 7.5 Min.Ser. (Topo.), FORT BELVOIR, Va. Quadr., 1965, pr. 1971.
C&GS, #560, 1:40,000 scale, POTOMAC RIVER, Mattawoman Creek to Georgetown, 1971.

PHOTOS: Aerial-VIMS 9Sep76 PW-1B/192-222.

SUBSEGMENT 2A

DEEPHOLE POINT TO THE MOUTH OF NEABSCO CREEK

(Maps 2 and 3)

EXTENT: 78,000 feet (14.8 mi.) of shoreline from Deephole Point to the mouth of Neabsco Creek, including Marumsco and Farm Creeks. The subsegment also includes 41,800 feet (7.9 mi.) of fastland.

SHORELANDS TYPE

FASTLAND: Low shore 97% (7.7 mi.) and moderately low shore 3% (0.2 mi.).

SHORE: Artificially stabilized 9% (1.3 mi.), beach 3% (0.5 mi.), fringe marsh 8% (1.1 mi.), embayed marsh 43% (6.4 mi.), and extensive marsh 37% (5.5 mi.).

NEARSHORE: Wide 27%. The remainder of the subsegment is located along Marumsco and Farm Creeks.

SHORELANDS USE

FASTLAND: Industrial 5% (0.4 mi.), preserved 19% (1.5 mi.), recreational 7% (0.5 mi.), residential 15% (1.2 mi.), unmanaged, wooded 32% (2.5 mi.), and governmental (U.S. Government Transmitting and Receiving Station) 22% (1.8 mi.).

SHORE: Mostly unused, some waterfowl hunting in the marshes.

NEARSHORE: Sport boating and fishing.

SHORELINE TREND: The shoreline trends basically E - W, then N - S in this subsegment. The fetch at the mouth of Marumsco Creek is SE - 4 nautical miles, and at the mouth of Farm Creek SE - 3.5 nautical miles.

OWNERSHIP: Private 52%, federal 42%, and county 6%.

ZONING: This subsegment is zoned variously for agricultural, business, industrial, and governmental use.

FLOOD HAZARD: Low to moderate, critical. The only area susceptible to flooding, aside from the tidal marshes, is the Bayside Park section. Many structures here are below the 10-foot contour, several of which might be inundated

during periods of abnormally high water. Other structures in the subsegment are above elevations of ten feet and are not susceptible to flooding.

BEACH QUALITY: Poor. The Featherstone Shores area has narrow, strip beaches which are often vegetated. Various other areas have small pocket beaches.

SHORE EROSION SITUATION

EROSION RATE: No data. The area appears to be stable.

ENDANGERED STRUCTURES: None.

SHORE PROTECTIVE STRUCTURES: There are approximately 3,600 feet of effective rubble riprap from Deephole Point to the mouth of Marumsco Creek. Bayside Park and Featherstone Shores have approximately 3,400 feet of bulkhead, most of which appears to be effective. There are also several groins along this section of shoreline. The marina just north of Featherstone Shores has approximately 300 feet of bulkhead which is mainly for commercial purposes.

OTHER SHORE STRUCTURES: There are docking facilities and a boat ramp at the marina as well as numerous piers along the shoreline.

SHORE USE LIMITATIONS: The shorelands in this subsegment are already used for a variety of purposes. Twenty-two percent of the lands are included in the U.S. Military Reservation. The 78-acre Veterans Memorial Park on the west side of Marumsco Creek is owned and operated by the county and comprises seven percent of the shorelands. A wildlife refuge, owned by the U.S. Department of the Interior, is located at the mouth of Neabsco Creek and contains nineteen percent of the fastland. Other uses, including residential and industrial sites, make up twenty percent of the fastland. Thus, sixty-eight percent of the subsegment's fastlands are utilized for some purpose. The remaining thirty-two percent is unmanaged, wooded. These unused areas are fronted by tidal marshes, which are protected by the Virginia Wetlands Act of 1972.

ALTERNATE SHORE USE: Low. This subsegment already has a county owned recreational park and a wildlife refuge along the shoreline. Little

alternate use seems necessary for the unused, wooded lands located in the subsegment.

MAPS: USGS, 7.5 Min.Ser. (Topo.), OCCOQUAN, Va. Quadr., 1966, pr. 1971;
USGS, 7.5 Min.Ser. (Topo.), FORT BELVOIR, Va. Quadr., 1965, pr. 1971;
USGS, 7.5 Min.Ser. (Topo.), QUANTICO, Va. Quadr., 1966, pr. 1971;
USGS, 7.5 Min.Ser. (Topo.), INDIAN HEAD, Va. Quadr., 1966.
C&GS, #560, 1:40,000 scale, POTOMAC RIVER, Mattawoman Creek to Georgetown, 1971.

PHOTOS: Aerial-VIMS 9Sep76 PW-2A/153-191.

SUBSEGMENT 2B

MOUTH OF NEABSCO CREEK TO FREESTONE POINT

(Maps 3 and 4)

EXTENT: 52,000 feet (9.8 mi.) of shoreline from the northern bank of Neabsco Creek to Freestone Point (including the creek). The subsegment also includes 28,600 feet (5.4 mi.) of fastland.

SHORELANDS TYPE

FASTLAND: Low shore 22% (1.2 mi.), moderately low shore 22% (1.2 mi.), moderately high shore 29% (1.6 mi.), high shore 22% (1.2 mi.), and high shore with bluff 5% (0.3 mi.).

SHORE: Artificially stabilized 1% (0.2 mi.), beach 11% (1.1 mi.), fringe marsh 24% (2.3 mi.), and embayed marsh 63% (6.2 mi.).

NEARSHORE: Wide 11%. The remainder of the subsegment is located along Neabsco Creek, which is too narrow and shallow for classification.

SHORELANDS USE

FASTLAND: Commercial 12% (0.6 mi.), industrial 3% (0.2 mi.), residential 4% (0.2 mi.), and unmanaged, wooded 81% (4.4 mi.).

SHORE: Some waterfowl hunting in the marshes, but mostly unused.

NEARSHORE: Sport boating and fishing.

SHORELINE TREND: Neabsco Creek trends basically NW - SE. The fetch at Freestone Point is NE - 2.5 nautical miles.

OWNERSHIP: Private 73%, city 21%, and county 6%.

ZONING: Mostly agricultural and residential, with some business.

FLOOD HAZARD: Low. All structures are above 10-foot elevations. Only the marsh areas are susceptible to flooding.

BEACH QUALITY: Poor to good. The beaches are located from the railroad bridge at Neabsco to Freestone Point, most of which are narrow and often vegetated. The beaches at Neabsco and Freestone Point are fairly wide and clean.

SHORE EROSION SITUATION

EROSION RATE: No data. Most of the subsegment appears to be stable. The bluffs at Freestone Point are experiencing minor erosion due to downhill rain runoff and undercutting of the cliff base.

ENDANGERED STRUCTURES: None.

SHORE PROTECTIVE STRUCTURES: There are approximately 1,200 feet of artificially stabilized shore in this subsegment. The majority of this is located at the marina facilities on the south bank of the creek. This bulkheading is mainly for cosmetic purposes rather than for erosion protection. There is approximately 50 feet of rubble riprap on the east side of the bridge, which appears to be effective.

OTHER SHORE STRUCTURES: There are several boat ramps and numerous piers in this subsegment, most of which are located at the marina facilities.

SHORE USE LIMITATIONS: Nineteen percent of the shorelands are already used for commercial, industrial, and residential purposes. The District of Columbia owns 1.1 miles of fastland just west of the railroad crossing which is presently wooded. The sanitary district owns 0.3 miles of fastland on the creek which is to be the site of a joint sewage treatment plant in the near future. The remaining fifty-four percent are unmanaged, wooded, which are generally located along the bluffs inland of the shoreline. Access to these areas is difficult.

ALTERNATE SHORE USE: For the 54% of the shoreline which is presently unused, development, though possible, would be costly.

MAPS: USGS, 7.5 Min.Ser. (Topo.), INDIAN HEAD, Va. Quadr., 1966;
USGS, 7.5 Min.Ser. (Topo.), QUANTICO, Va. Quadr., 1966, pr. 1971.
C&GS, #560, 1:40,000 scale, POTOMAC RIVER, Mattawoman Creek to Georgetown, 1971.

PHOTOS: Aerial-VIMS 26Jul76 PW-2B/132-146.
9Sep76 PW-2B/147-152.

SUBSEGMENT 3A

FREESTONE POINT TO COCKPIT POINT

(Map 4)

EXTENT: 36,000 feet (6.8 mi.) of shoreline from Freestone Point to Cockpit Point, including Powells Creek. The subsegment also includes 35,200 feet (6.7 mi.) of fastland.

SHORELANDS TYPE

FASTLAND: Low shore 31% (2.1 mi.), moderately low shore 26% (1.7 mi.), moderately high shore 20% (1.3 mi.), high shore 18% (1.2 mi.), and high shore with bluff 5% (0.4 mi.).

SHORE: Artificially stabilized 3% (0.1 mi.), beach 32% (2.2 mi.), fringe marsh 27% (1.9 mi.), and embayed marsh 38% (2.6 mi.).

NEARSHORE: Narrow 18% and wide 16%. The remainder of the subsegment is located along Powells Creek which is too narrow and shallow for classification.

SHORELANDS USE

FASTLAND: Industrial 15% (1.0 mi.), residential 8% (0.5 mi.), and unmanaged, wooded 77% (5.2 mi.).

SHORE: Some waterfowl hunting in the marshes, bathing and strolling along the beaches.

NEARSHORE: Sport boating and fishing.

SHORELINE TREND: The shoreline trends basically NE - SW then NW - SE. The fetch at Cockpit Point is NE - 6.6 nautical miles.

OWNERSHIP: Entirely private.

ZONING: Industrial, agricultural, and residential.

FLOOD HAZARD: Low. The majority of the subsegment has elevations of 20 feet and over. Only the marsh areas are subject to flooding.

BEACH QUALITY: Fair to good. There are long stretches of wide, clean beaches in this subsegment.

SHORE EROSION SITUATION

EROSION RATE: No data. The area appears to be stable.

ENDANGERED STRUCTURES: None.

SHORE PROTECTIVE STRUCTURES: There is one groin in the subsegment which appears to be effective.

OTHER SHORE STRUCTURES: There is one large fishing pier and a boat house on the beach.

SHORE USE LIMITATIONS: This subsegment is variously zoned for industrial, residential, and agricultural use. Basically, Powells Creek is zoned for agriculture, while the shoreline bordering the Potomac River is residential north of the creek and industrial south of the creek.

The section from Freestone Point to the mouth of Powells Creek, though zoned for residential use, is mostly unused. Future development here is a possibility. The shorelands of Powells Creek are entirely wooded except for an apartment complex behind the marsh at the head of the creek. According to a published VIMS report, Prince William County Tidal Marsh Inventory, there are 123 acres of marsh in this subsegment. This marsh should be preserved as it is valuable as a nursery and spawning area for some fishes, and as a habitat for other fishes and wildlife. It also serves to cushion the energy of erosive and flood forces attacking the fastland. The fastland along the creek rapidly increases to elevations of 100 feet. There are no roads to the shorelands.

The shorelands from the south side of the creek mouth to Cockpit Point are zoned for industry. Most of this section has limited widths of usable land, as a railroad is situated less than 300 feet inland along much of the shoreline. The Cockpit Point area has elevations of less than 10 feet and parts are susceptible to flooding.

ALTERNATE SHORE USE: Low. There are two areas in the subsegment which could be developed for residential use. However, any development should ensure against adding pollutants to the nearby waters. Though no area seems suitable for a full scale recreational development, a low intensity recreational park along the shorelands near Georgetown Village is possible.

MAPS: USGS, 7.5 Min.Ser. (Topo.), INDIAN HEAD, Va. Quadr., 1966;
USGS, 7.5 Min.Ser. (Topo.), QUANTICO, Va. Quadr., 1966, pr. 1971.

C&GS, #559, 1:40,000 scale, POTOMAC RIVER, Lower Cedar Point to Mattawoman Creek, 1971.

PHOTOS: Aerial-VIMS 26Jul76 PW-3A/95-131.

SUBSEGMENT 3B

COCKPIT POINT TO POSSUM POINT

(Maps 4 and 5)

EXTENT: 13,400 feet (2.5 mi.) of shoreline along the Potomac River from Cockpit Point to Possum Point. The subsegment also includes 14,000 feet (2.7 mi.) of fastland.

SHORELANDS TYPE

FASTLAND: Low shore 10% (0.3 mi.), moderately low shore 14% (0.4 mi.), moderately high shore 26% (0.7 mi.), high shore 27% (0.7 mi.), and high shore with bluff 23% (0.6 mi.).

SHORE: Artificially stabilized 22% (0.6 mi.), beach 75% (1.9 mi.), and embayed marsh 3% (0.1 mi.).

NEARSHORE: Narrow.

SHORELANDS USE

FASTLAND: Industrial 34% (0.9 mi.) and unmanaged, wooded 66% (1.8 mi.).

SHORE: Mostly unused.

NEARSHORE: Sport boating and fishing.

SHORELINE TREND: The shoreline trends basically NE - SW in this subsegment. The fetch at Possum Point is NE - 4.4 nautical miles.

OWNERSHIP: Entirely private.

ZONING: Industrial.

FLOOD HAZARD: Low. The majority of the subsegment has elevations of at least 20 feet and is not subject to flooding.

BEACH QUALITY: Poor to fair. There are several areas with fairly wide beaches in this subsegment.

SHORE EROSION SITUATION

EROSION RATE: No historical data. The bluff area north of the power plant is experiencing erosion due to downhill rain runoff, and undercutting of the cliff base by wind and wave actions.

ENDANGERED STRUCTURES: None.

SHORE PROTECTIVE STRUCTURES: There are approximately 3,000 feet of rubble riprap and

bulkheading at the substation site near Possum Point. This stabilization appears to be effective.

OTHER SHORE STRUCTURES: There is a large pier at the substation site.

SHORE USE LIMITATIONS: This subsegment is zoned for industrial use. The Vepco Power Station, located near Possum Point, is the only industrial site at the present time. However, the Richmond, Fredericksburg and Potomac Railroad line, located 50 to 100 feet inland, severely limits shorelands access and development.

ALTERNATE SHORE USE: For the 66% of the shorelands which are presently unused, development depends upon access across the railroad tracks.

MAPS: USGS, 7.5 Min.Ser. (Topo.), QUANTICO, Va. Quadr., 1966, pr. 1971.
C&GS, #559, 1:40,000 scale, POTOMAC RIVER, Lower Cedar Point to Mattawoman Creek, 1971.

PHOTOS: Aerial-VIMS 26Jul76 PW-3B/69-94.

SEGMENT 4

QUANTICO CREEK

(Maps 4 and 5)

EXTENT: 58,400 feet (11.1 mi.) of shoreline along Quantico Creek, from Possum Point to Shipping Point. The segment also includes 51,000 feet (9.8 mi.) of fastland.

SHORELANDS TYPE

FASTLAND: Low shore 10% (1.0 mi.), moderately low shore 63% (6.1 mi.), moderately high shore 14% (1.3 mi.), high shore 8% (0.8 mi.), and high shore with bluff 3% (0.3 mi.).

SHORE: Artificially stabilized 3% (0.3 mi.), beach 25% (2.8 mi.), fringe marsh 24% (2.7 mi.), embayed marsh 30% (3.4 mi.), and extensive marsh 17% (1.9 mi.).

CREEK: The entire segment is located along Quantico Creek, which is too narrow and shallow for classification.

SHORELANDS USE

FASTLAND: Industrial 24% (2.3 mi.), residential 12% (1.1 mi.), unmanaged, wooded 35% (3.4 mi.), and governmental (Quantico Marine Corps School) 29% (2.8 mi.).

SHORE: Waterfowl hunting in the marshes, bathing and strolling along the beach areas.

CREEK: Some sport fishing and boating.

SHORELINE TREND: The shoreline trends basically SE - NW in this segment.

OWNERSHIP: Federal 29% and private 71%.

ZONING: Mostly agricultural with some commercial.

FLOOD HAZARD: Low. The majority of the segment has elevations of at least 20 feet and is not subject to flooding.

BEACH QUALITY: Poor. There are only narrow, strip beaches in this segment.

SHORE EROSION SITUATION

EROSION RATE: No historical data. The area appears to be stable, although several bluff areas are experiencing minor erosion due to

downhill rain runoff.

ENDANGERED STRUCTURES: None.

SHORE PROTECTIVE STRUCTURES: There are approximately 1,800 feet of effective bulkheading in this segment.

OTHER SHORE STRUCTURES: There are several private piers and the Richmond, Fredericksburg and Potomac Railroad bridge in this segment.

SHORE USE LIMITATIONS: Quantico Creek has areas of high intensity use and other areas totally unused. The north side of the creek mouth is used for industrial purposes, being the site of an electric substation. The south side of the creek mouth is part of the Quantico Marine Corps land and, though mostly unused, is not available for private development. Quantico Creek has a total of 242 acres of marsh land, mostly located at the head of the creek. These marshes are valuable as spawning and nursery grounds for many fish species, and as habitats for other fish and wildlife.

Several areas near the head of Quantico Creek are being developed for residential purposes. These sub-developments should ensure against damaging the marshes and adding pollutants to the creek.

ALTERNATE SHORE USE: Low. The only areas available for development are located along the upper portion of Quantico Creek. However, much of this area is already used for residential purposes. Aside from the several subdivisions along the shoreline, the town of Dumfries is located at the head of the creek, behind the marsh, limiting further development.

The wooded area near the town of Dumfries could be developed as a low intensity recreational park, with such activities as picnicking, hiking and camping. Other alternate uses for this segment seem very limited due to existing use and ownership.

MAPS: USGS, 7.5 Min.Ser. (Topo.), QUANTICO, Va. Quadr., 1966, pr. 1971.
C&GS, #559, 1:40,000 scale, POTOMAC RIVER, Lower Cedar Point to Mattawoman Creek, 1971.

PHOTOS: Aerial-VIMS 26Jul76 PW-4/33-68.

SUBSEGMENT 5A

SHIPPING POINT TO COUNTY LINE

(Map 5)

EXTENT: 19,000 feet (3.6 mi.) of shoreline from Shipping Point to the county line, including Chopawamsic Island. The subsegment also includes 17,800 feet (3.4 mi.) of fastland.

SHORELANDS TYPE

FASTLAND: Low shore 17% (0.6 mi.), moderately low shore 80% (2.7 mi.), and moderately low shore with bluff 3% (0.1 mi.).

SHORE: Artificially stabilized 40% (1.4 mi.), beach 40% (1.4 mi.), embayed marsh 10% (0.4 mi.), and extensive marsh 10% (0.4 mi.).

NEARSHORE: Narrow 27% and intermediate 44%. The remainder of the subsegment is located along the marsh creek and the sheltered side of Chopawamsic Island.

SHORELANDS USE

FASTLAND: Residential 16% (0.5 mi.) and governmental (U.S. Marine Corps facilities and air station) 84% (2.8 mi.).

SHORE: Mostly unused except for access to boat docks.

NEARSHORE: Sport boating and fishing.

SHORELINE TREND: The shoreline trends basically NE - SW in this subsegment. The fetch at Shipping Point is NE - 4.9 nautical miles. The fetch at the southern end of Chopawamsic Island is SSE - 10.0 nautical miles.

OWNERSHIP: Federal 84% and private 16%.

ZONING: Governmental and some agricultural.

BEACH QUALITY: Poor. The majority of the subsegment has narrow, strip beaches.

FLOOD HAZARD: Low. The majority of the subsegment has elevations of at least 20 feet and is not subject to flooding.

SHORE EROSION SITUATION

EROSION RATE: No historical data. Recent studies show that the majority of the subsegment is stable, although sections of Chopawamsic Island are experiencing moderate erosion.

This is due to downhill rain runoff and wind and wave actions at the base of the cliff.
ENDANGERED STRUCTURES: One house on the northern end of Chopawamsic Island is endangered by erosion.

SHORE PROTECTIVE STRUCTURES: There is approximately 7,600 feet of artificial stabilization, the majority of which is at the H.Q. Battalion Boat Dock. Stabilization at the southern end of Chopawamsic Island is now totally ineffective. The entire airfield area is artificial fill. Prior to the construction of the airfield in the early 1930's, the mouth of Chopawamsic Creek was coincident with the county line.

OTHER SHORE STRUCTURES: There are two large piers at the boat dock, with several boat slips.

SHORE USE LIMITATIONS: All of the subsegment, with the exception of Chopawamsic Island, is included in the Quantico Marine Corps School, which is federally owned. Chopawamsic Island is privately owned and is used for residential purposes. Little or no other development is possible for this subsegment.

ALTERNATE SHORE USE: Low. The present use and ownership of this subsegment precludes alternate development.

MAPS: USGS, 7.5 Min.Ser. (Topo.), QUANTICO, Va. Quadr., 1966, pr. 1971.
C&GS, #559, 1:40,000 scale, POTOMAC RIVER, Lower Cedar Point to Mattawoman Creek, 1971.

PHOTOS: Aerial-VIMS 26Jul76 PW-5A/12-32.

SUBSEGMENT 5B

CHOPAWAMSIK CREEK

(Map 5)

interests.

ALTERNATE SHORE USE: None. The present government ownership and use of this subsegment prohibits alternate development.

MAPS: USGS, 7.5 Min.Ser. (Topo.), QUANTICO, Va. Quadr., 1966, pr. 1971.
C&GS, #559, 1:40,000 scale, POTOMAC RIVER, Lower Cedar Point to Mattawoman Creek, 1971.

PHOTOS: Aerial-VIMS 26Jul76 PW-5B/1-11.

EXTENT: 14,400 feet (2.7 mi.) of shoreline along the northern bank of Chopawamsic Creek. The subsegment also includes 19,200 feet (3.7 mi.) of fastland.

SHORELANDS TYPE

FASTLAND: Low shore 42% (1.5 mi.), moderately low shore 16% (0.6 mi.), moderately high shore 21% (0.8 mi.), and high shore 21% (0.8 mi.).

SHORE: Fringe marsh 46% (1.2 mi.) and embayed marsh 54% (1.5 mi.).

CREEK: The entire subsegment is located along Chopawamsic Creek, which is too narrow and shallow for classification.

SHORELANDS USE

FASTLAND: Entirely governmental (U.S. Marine Corps School).

SHORE: Mostly unused.

CREEK: Sport boating and fishing.

SHORELINE TREND: The shoreline trends basically E - W in this subsegment.

OWNERSHIP: Federal.

ZONING: Government Military Reservation.

FLOOD HAZARD: Low. The majority of the shoreline has elevations of at least 10 feet. Only the marsh areas are subject to flooding.

BEACH QUALITY: There are no beaches in this subsegment.

SHORE EROSION SITUATION

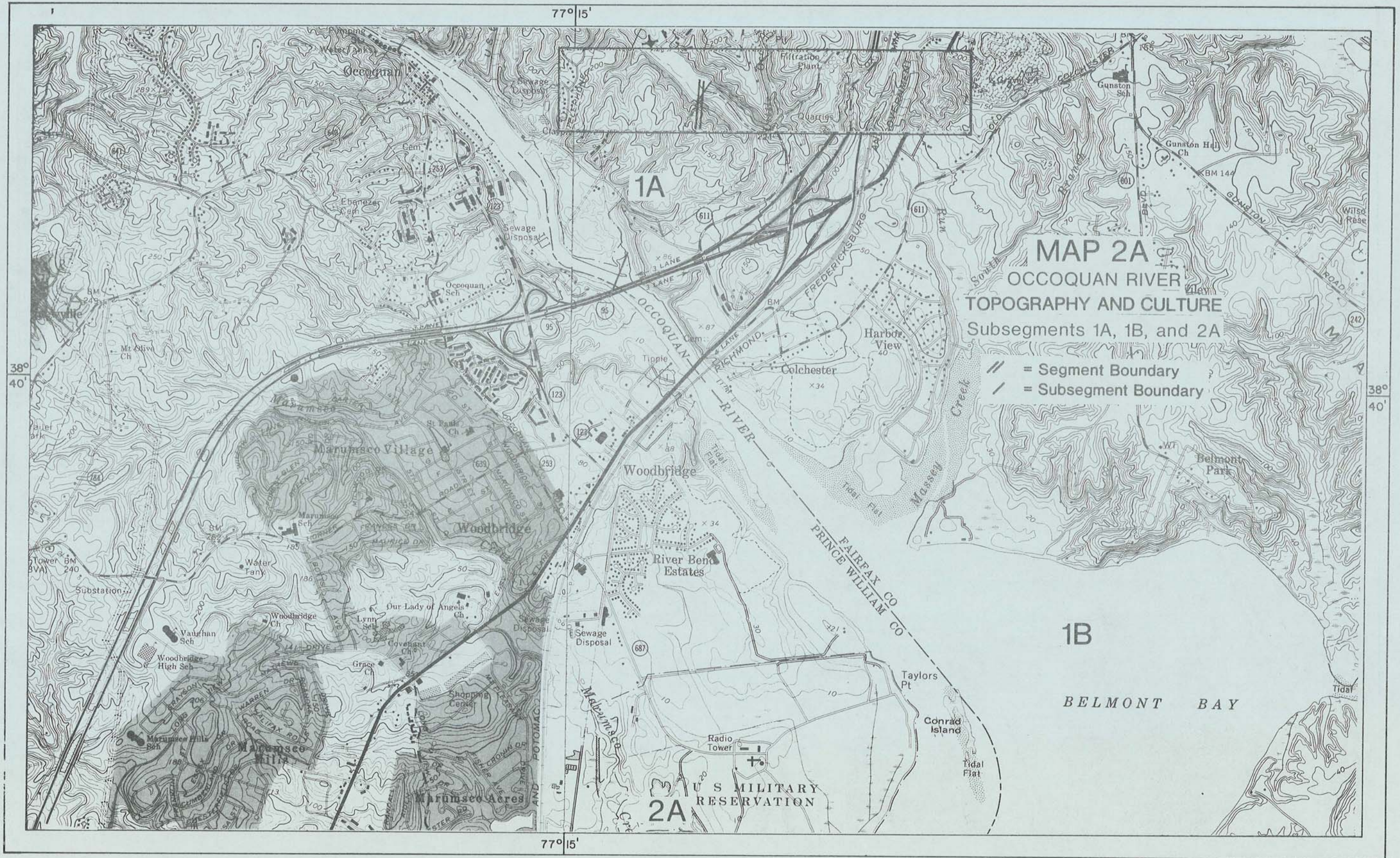
EROSION RATE: No data. The area appears to be stable.

ENDANGERED STRUCTURES: None.

SHORE PROTECTIVE STRUCTURES: None.

OTHER SHORE STRUCTURES: None.

SHORE USE LIMITATIONS: This subsegment is entirely owned by the federal government. No lands are available for development by private

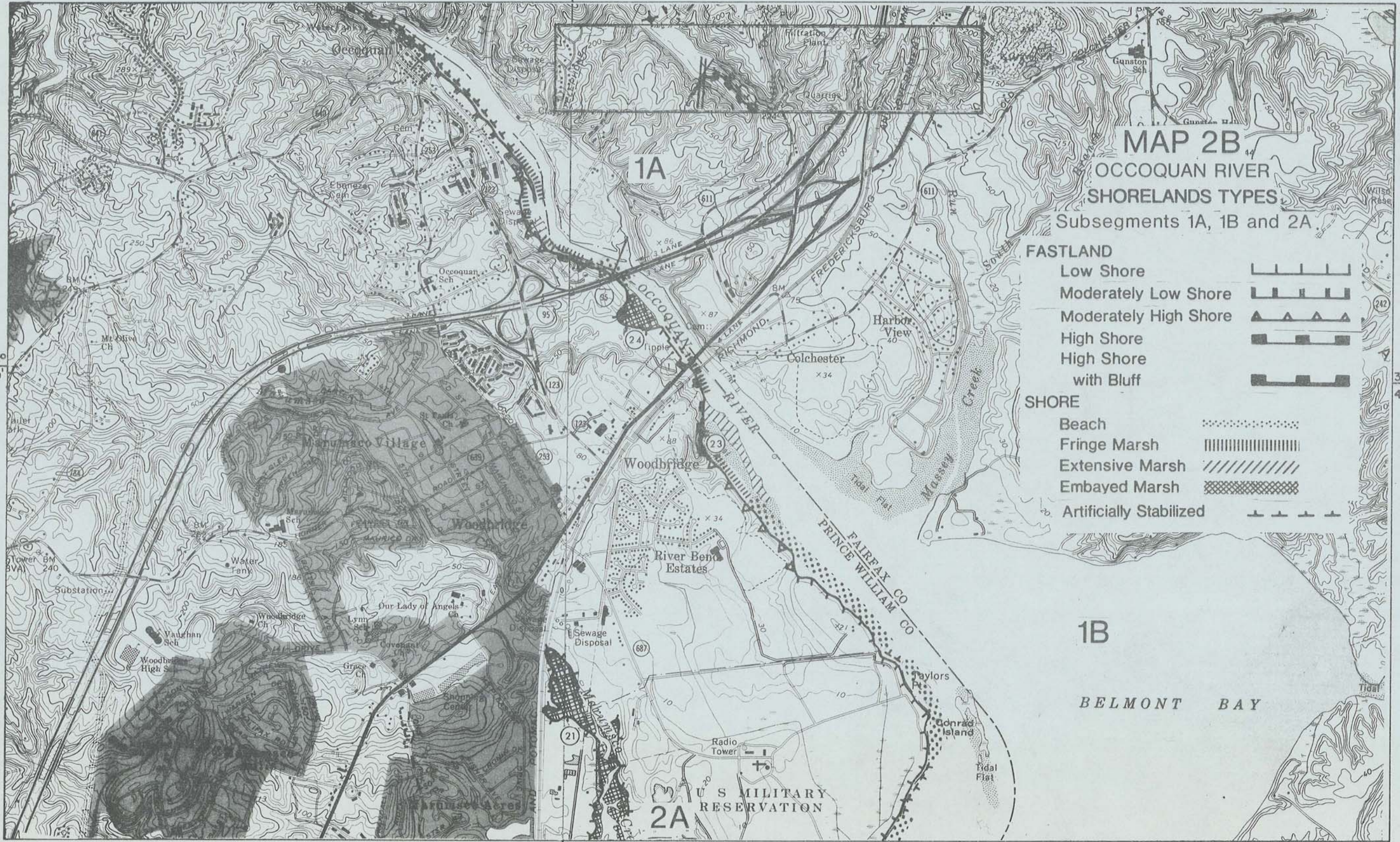


77° 15'

38° 40'

38° 40'

77° 15'








MAP 2B


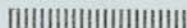



OCOCOQUAN RIVER SHORELANDS TYPES

Subsegments 1A, 1B and 2A.

FASTLAND

- Low Shore 
- Moderately Low Shore 
- Moderately High Shore 
- High Shore 
- High Shore with Bluff 

SHORE

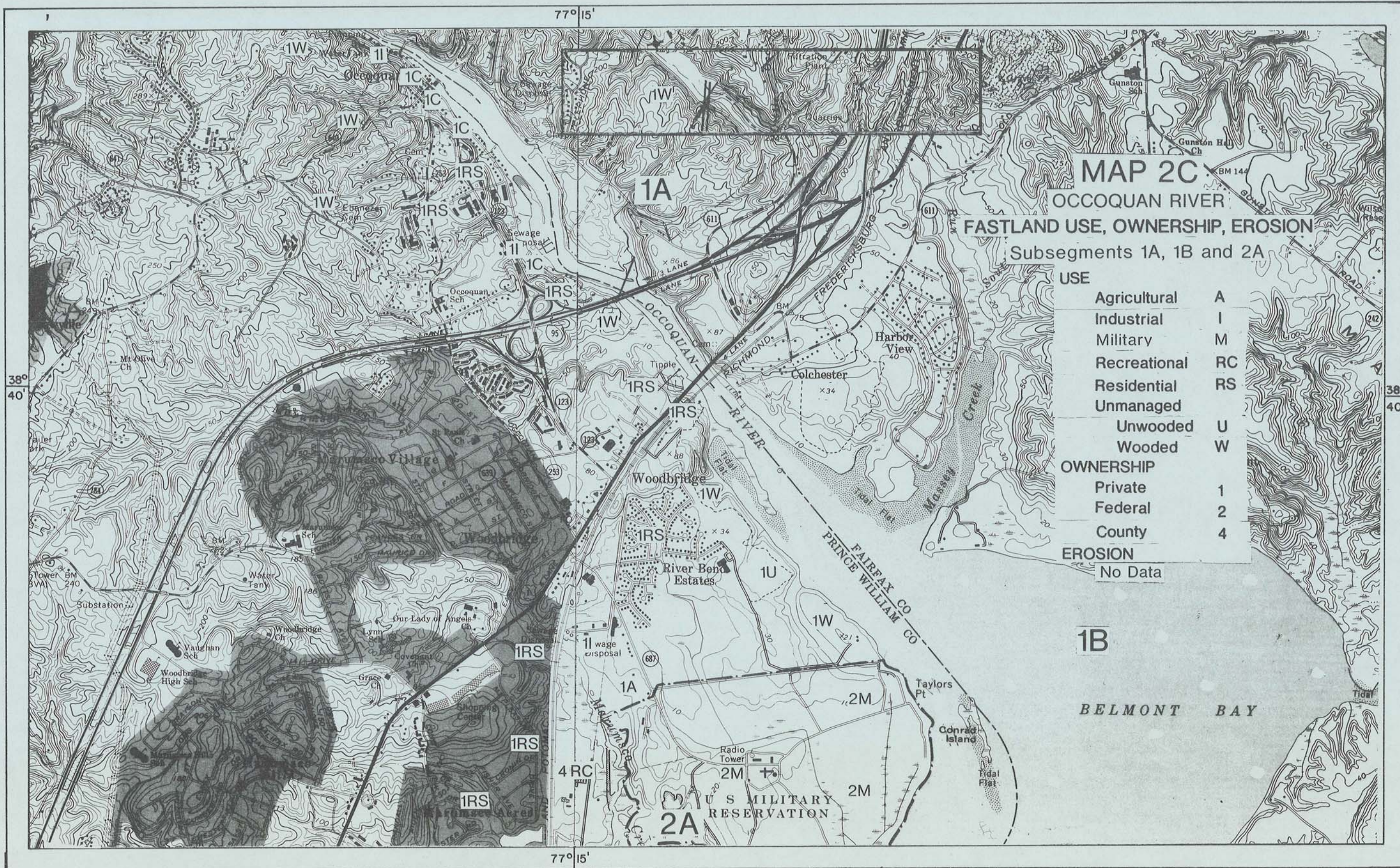
- Beach 
- Fringe Marsh 
- Extensive Marsh 
- Embayed Marsh 
- Artificially Stabilized 

U.S. MILITARY RESERVATION

1B

BELMONT BAY

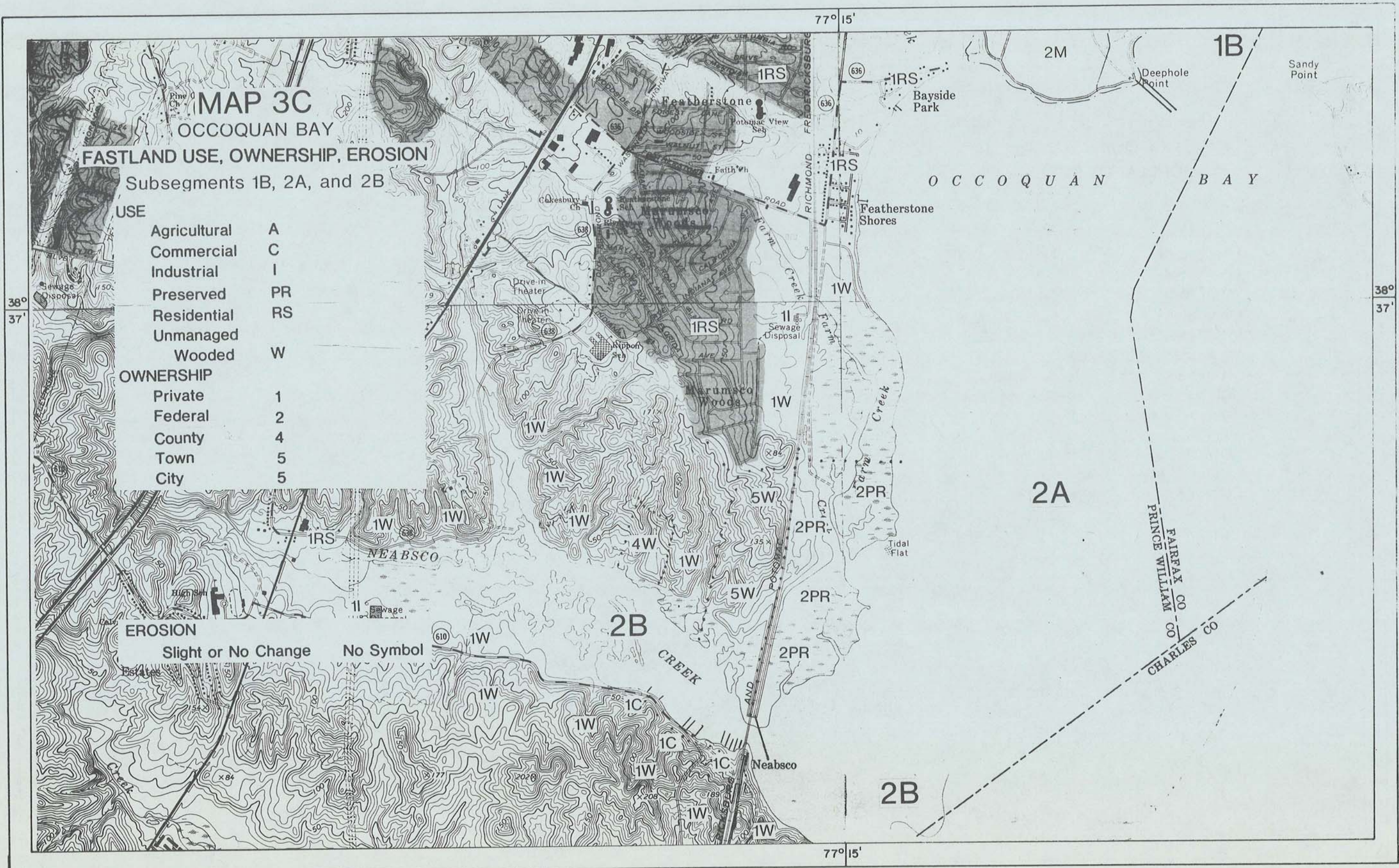
2A



MAP 2C

OCOCOQUAN RIVER
 FASTLAND USE, OWNERSHIP, EROSION
 Subsegments 1A, 1B and 2A

USE	
Agricultural	A
Industrial	I
Military	M
Recreational	RC
Residential	RS
Unmanaged	
Unwooded	U
Wooded	W
OWNERSHIP	
Private	1
Federal	2
County	4
EROSION	
No Data	



MAP 3C

OCCOQUAN BAY

FASTLAND USE, OWNERSHIP, EROSION

Subsegments 1B, 2A, and 2B

USE

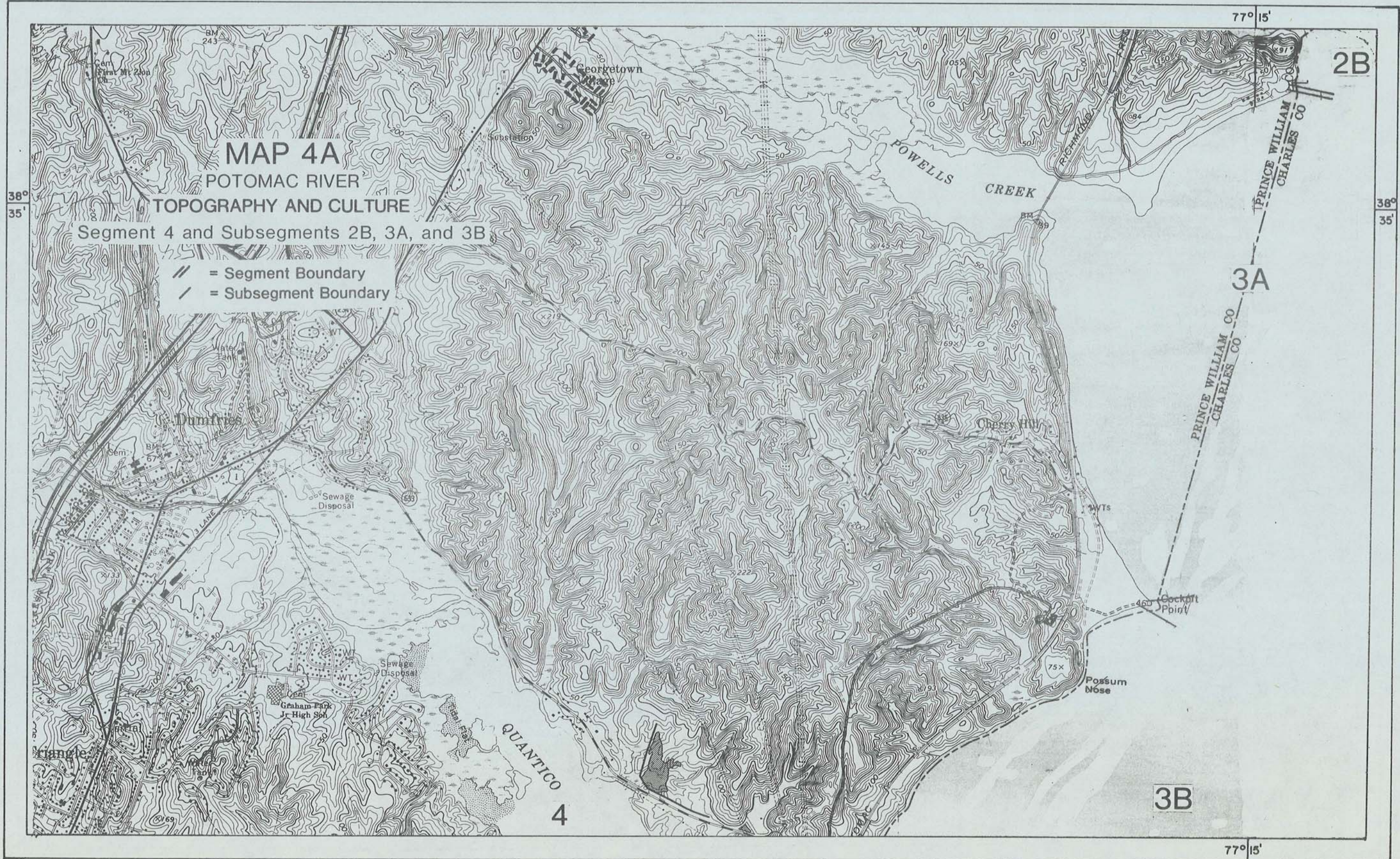
- Agricultural A
- Commercial C
- Industrial I
- Preserved PR
- Residential RS
- Unmanaged
- Wooded W

OWNERSHIP

- Private 1
- Federal 2
- County 4
- Town 5
- City 5

EROSION

- Slight or No Change
- No Symbol



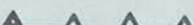




MAP 4B



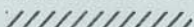


POTOMAC RIVER SHORELANDS TYPES

Segment 4 and Subsegments 2B, 3A, and 3B



FASTLAND

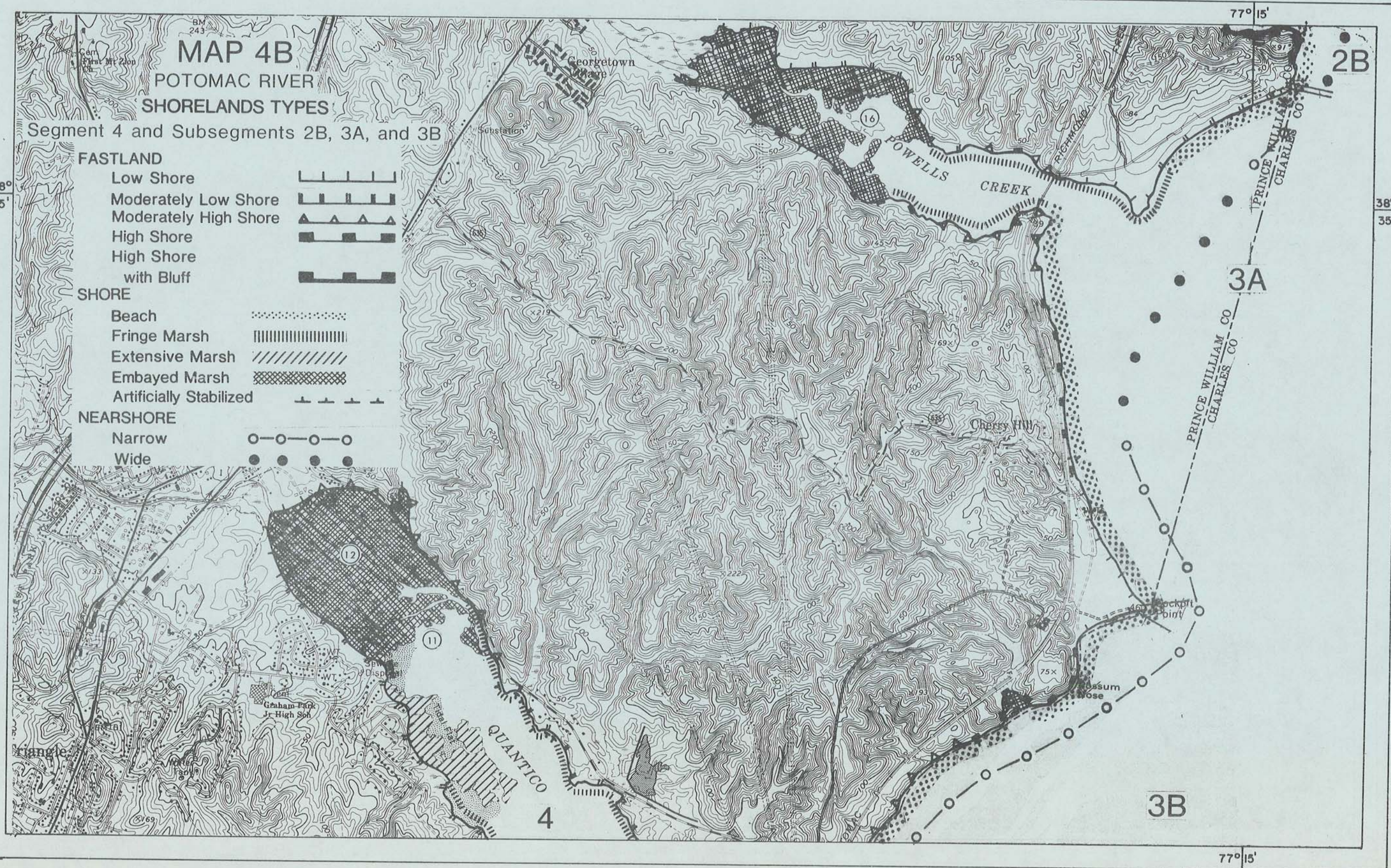
- Low Shore 
- Moderately Low Shore 
- Moderately High Shore 
- High Shore 
- High Shore with Bluff 

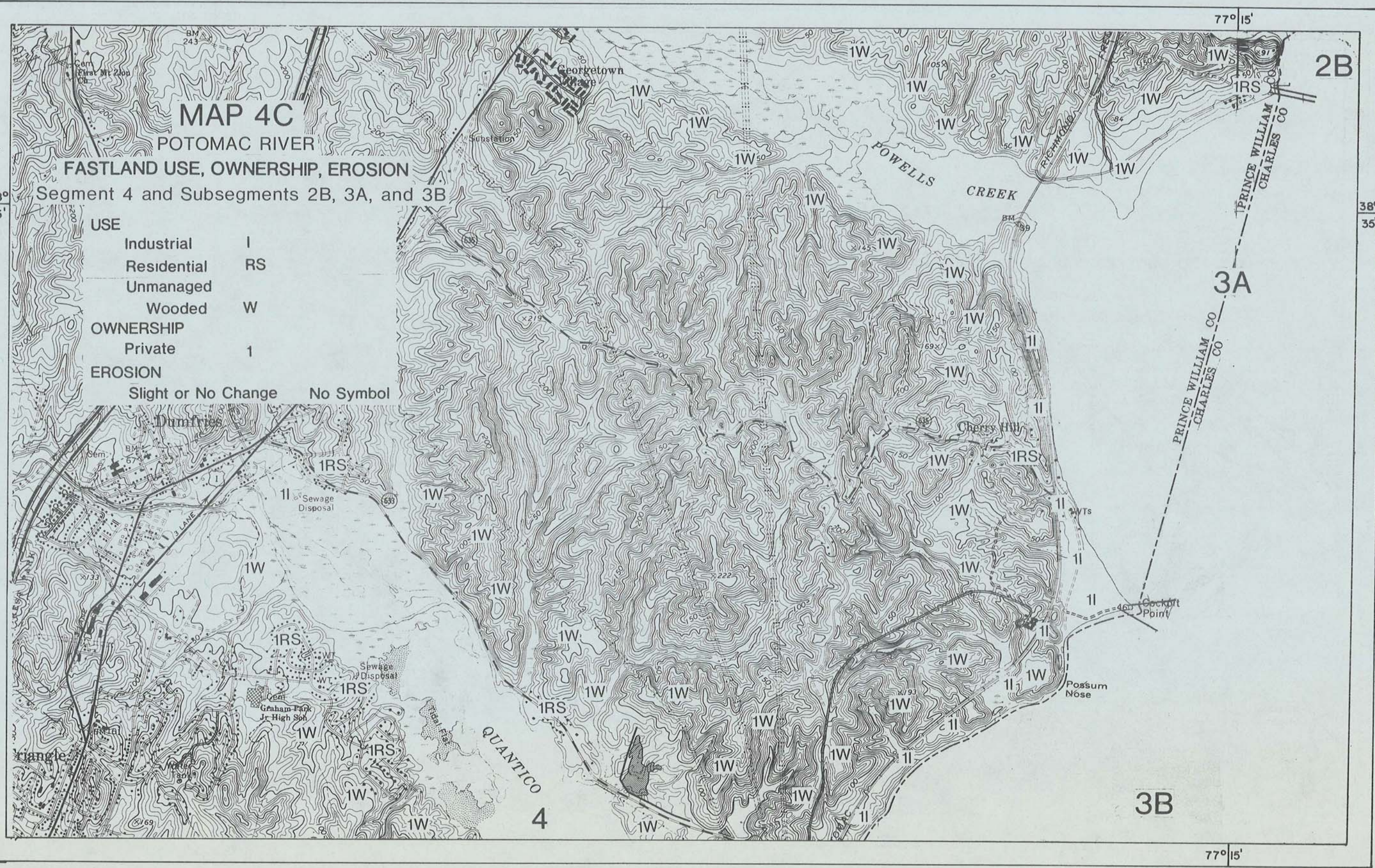
SHORE

- Beach 
- Fringe Marsh 
- Extensive Marsh 
- Embayed Marsh 
- Artificially Stabilized 

NEARSHORE

- Narrow 
- Wide 





MAP 4C

POTOMAC RIVER FASTLAND USE, OWNERSHIP, EROSION

Segment 4 and Subsegments 2B, 3A, and 3B

USE	
Industrial	I
Residential	RS
Unmanaged	
Wooded	W
OWNERSHIP	
Private	1
EROSION	
Slight or No Change	No Symbol

2B

3A

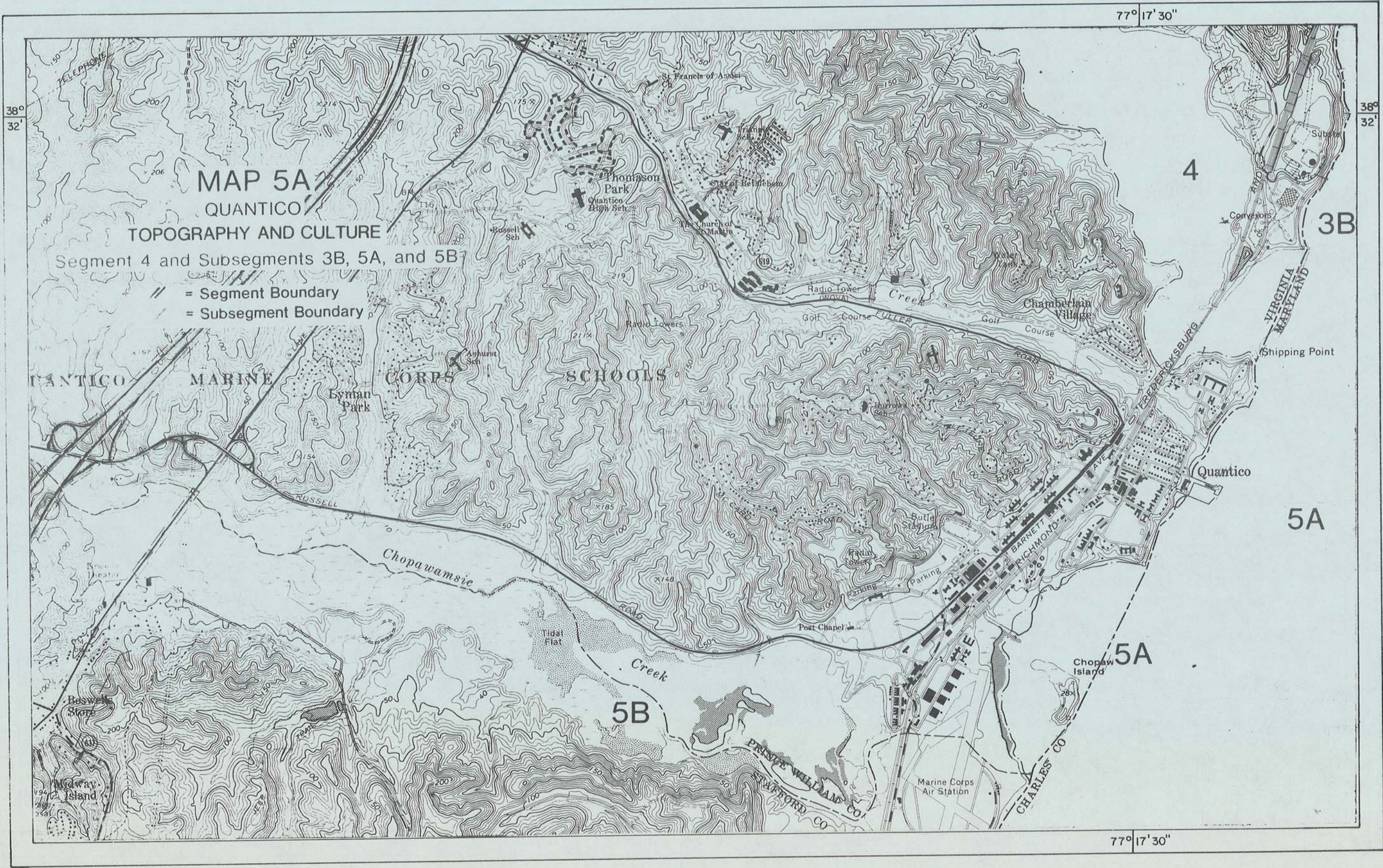
3B

QUANTICO
4

77° 15'

38° 35'

38° 35'



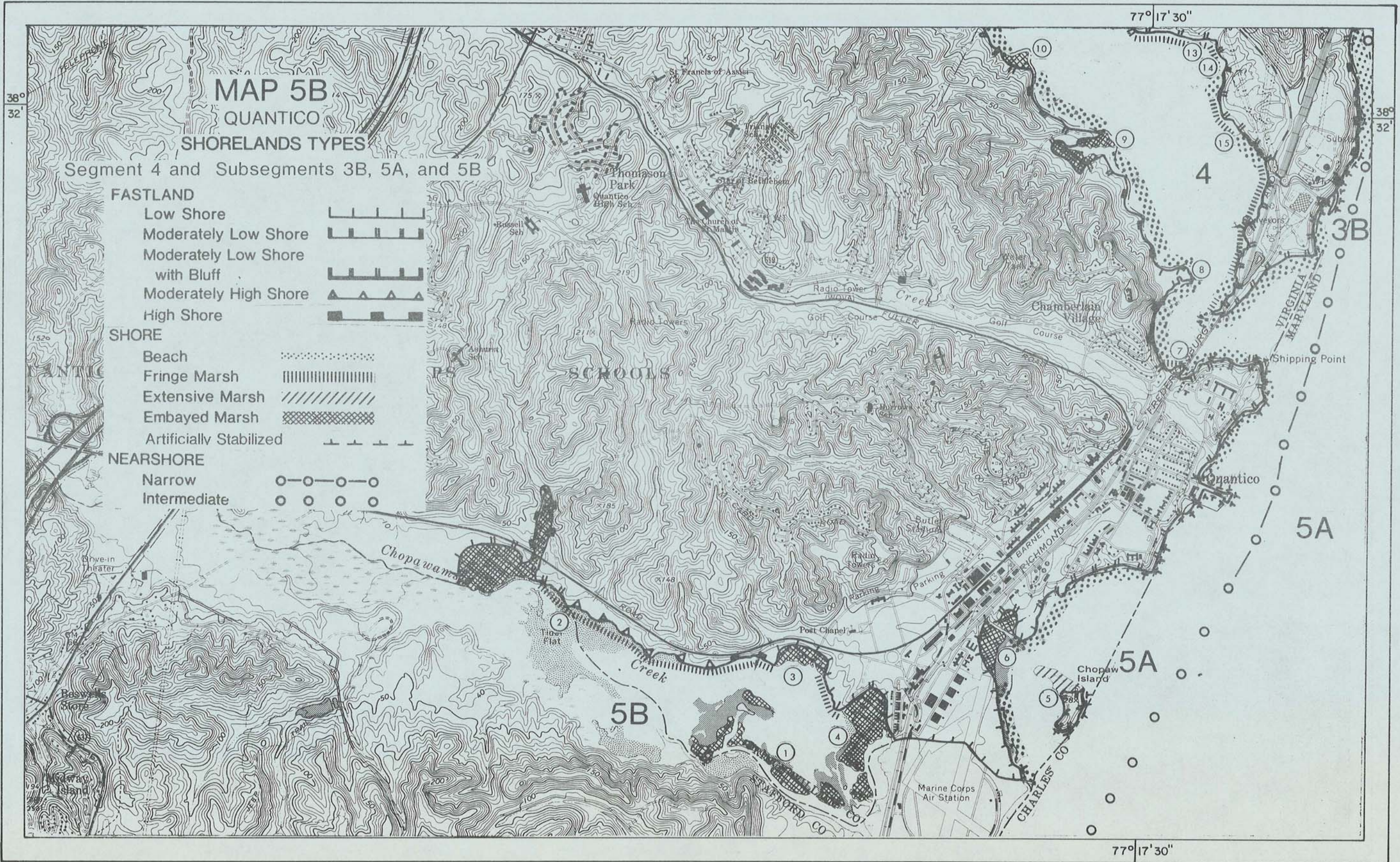
MAP 5A

QUANTICO

TOPOGRAPHY AND CULTURE

Segment 4 and Subsegments 3B, 5A, and 5B

- = Segment Boundary
- = Subsegment Boundary



77° 17' 30"

38° 32'

38° 32'

77° 17' 30"

MAP 5C

QUANTICO

FASTLAND USE, OWNERSHIP, EROSION

Segment 4 and Subsegments 3B, 5A, and 5B

Military Boundary

County Boundary

USE

- Industrial I
- Military M
- Wooded W

OWNERSHIP

- Private 1
- Federal 2

EROSION

- Slight or No Change
- No Symbol

